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PC MAGAZINE

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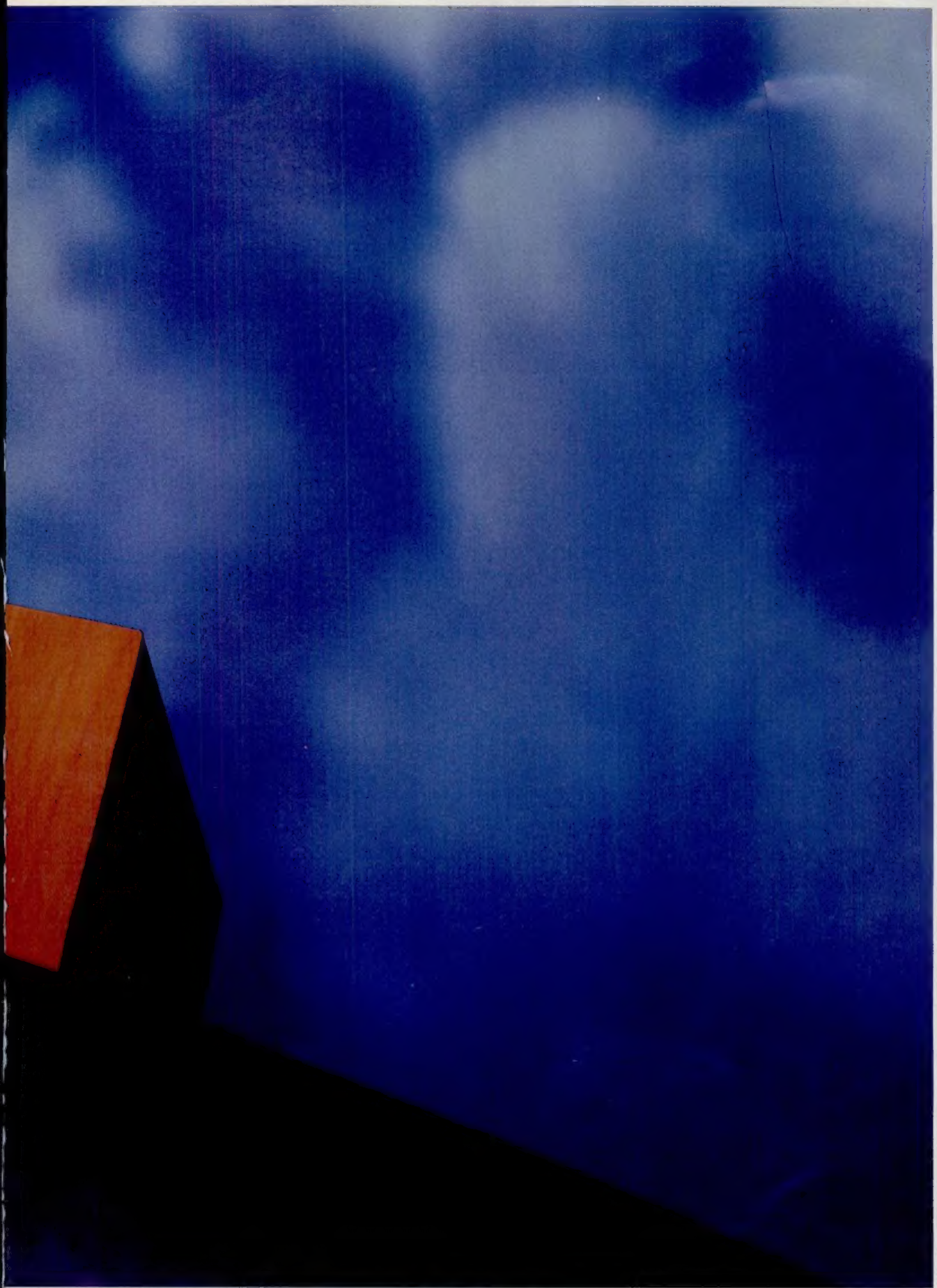

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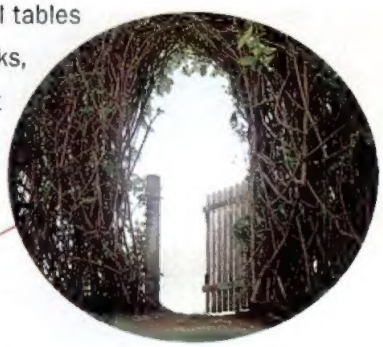

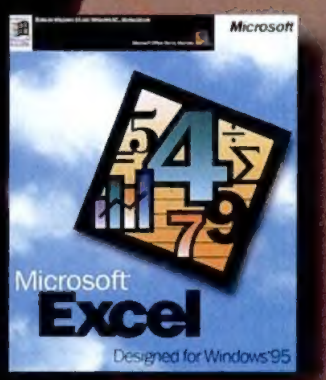

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Inside

A lot of people will tell you that buying the "right" PC hardware and software isn't as important as getting the most out of what you do buy, right or not. A lot of those folks work right here at *PC Magazine*. Many of them spent more than a month testing, analyzing, and evaluating hundreds of products for this issue's guide to essential utilities.

Along the way, our testing confirmed what the booming utilities market has been saying for months: For all their new-technology bells and whistles, the latest operating systems—Windows 95 and OS/2 Warp in particular—have not lessened the need for a broad range of additional tools.

No matter what operating system you use and no matter how savvy a PC user you might be, you need to have the right utilities in your PC toolbox to keep your daily computing experience running smoothly. No matter who you are, this issue has something you need. Whatever the category, we've got you covered: desktop enhancers, uninstallers, antivirus software, file viewers, file compression/decompression utilities, memory managers, diagnostic tools, backup utilities, Internet search tools and plug-ins, and much more.

The hundreds—perhaps thousands—of hours of testing, writing, and editing required for this utilities blockbuster were the work of dozens of *PC Magazine* staffers and contributors. In the Labs, technical director Ben Gottesman and project leader Dan Smith oversaw the development of many new testing methodologies and scripts for what in some cases were first-of-a-kind analyses. After testing ended, senior associate editor Lance Ulanoff and senior editor Tom Mace saw the project through to completion under the watchful eye of executive editor Don Willmott.

The result? A computer user's guide to essential PC utilities that will provide at least one tool you'll be ready to strap on and put to good use. Happy tinkering.—*Jake Kirchner*

Helping evaluate 170 utilities has left executive editor Don Willmott feeling a little boxed in.

PHOTO BY THOM O'CONNOR

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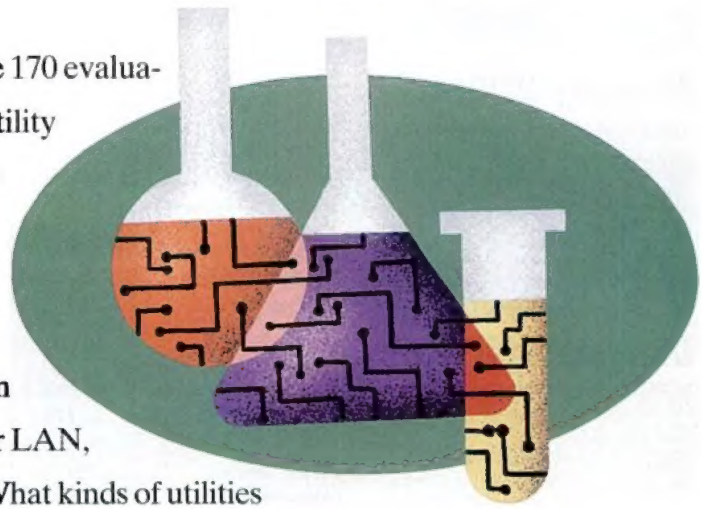
COVER STORY

THE ULTIMATE UTILITY GUIDE

BY LANCE ULANOFF

Browse through these 170 evaluations of 14 different utility categories and you're bound to find great solutions for some of your toughest computing challenges—on your desktop, on your LAN, and on the Internet. What kinds of utilities will help you most? Turn this page and see 100



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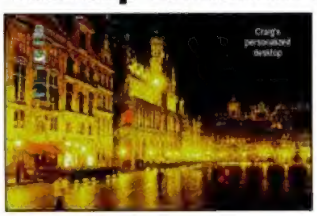

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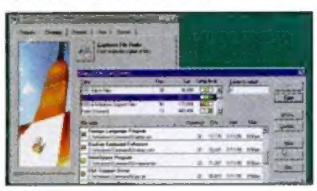

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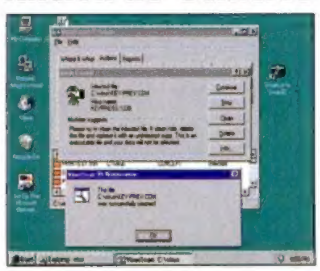

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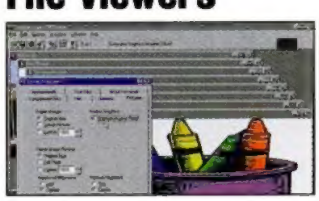

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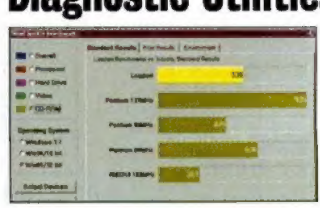

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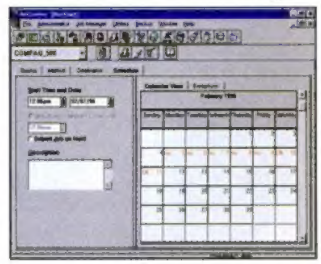

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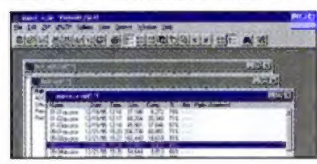

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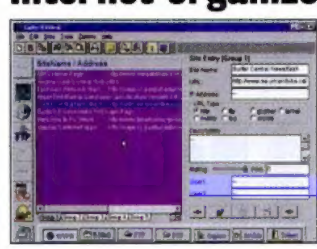

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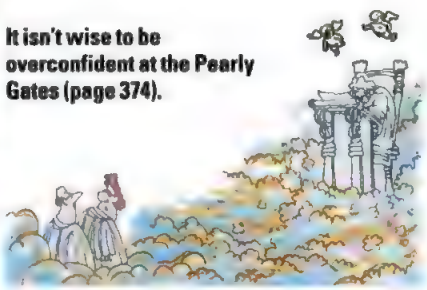

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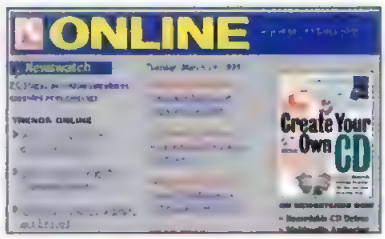

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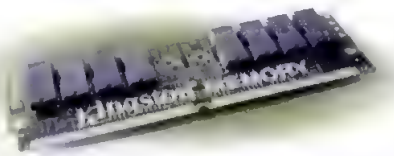

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95. COUNT THEM WITH THE OTHER.

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- [illegible]
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- [illegible]
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- 6.2 Pounds
- Extendable 1 Year Warranty
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$1999[2]
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- 256KB L2 Cache
- 540MB Removable Hard Drive (1.2GB Max)
- Smart Lithium Ion Battery with Advanced Power Management
- 32-bit Local-bus Video, 1MB Video RAM
- 2 Type II/1 Type III PCMCIA Slots
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- 256KB L2 Cache
- 540MB Removable Hard Drive (1.2GB Max)
- 14.4 XJACK Modem
- Smart Lithium Ion Battery with Advanced Power Management
- 32-bit Local-bus Video, 1MB Video RAM
- 2 Type II/1 Type III PCMCIA Slots
- 6.2 Pounds
- Extendable 1 Year Warranty

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Dell's featured computer artist is Mark Wagner.

No PCs run Windows 95 as well as Dell PCs. Just ask *PC World*, who recently reviewed over 160 desktops and notebooks to judge how well they run Windows 95. And in the end, Dell cleaned up with four Best Buy Awards.

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Letters

ONLINE MUSINGS

You listed America Online (AOL) among the Best Products of 1995 (January 9, 1996) in recognition of its "nationwide speed of 28.8 kilobits per second." I'm not sure where you got your information. Here in Macon, Georgia, we have a blistering connect speed of 9,600 bps. The software sets itself up on this speed, and AOL customer support says this is as fast as it gets. Since you also mention AOL having great Internet support, I'd like to know how enjoyable you think the Web is at 9,600 bps. Fortunately our CompuServe access speed is a more tolerable 14.4 Kbps.

J. PATRICK MCGOUIRK
via PC MagNet

I can't understand why *PC Magazine* touts service providers like AOL so much. I've tried them all—AOL, Prodigy, and CompuServe. There is an underlying problem with all of them: cost. It took me a while, but now I realize local providers are the way to go.

PHIL OLSON
Austin, Texas

I must take exception to your statements that AOL is "the Internet provider of choice" and that one of its "finest features" is price. The fact is that AOL is very costly as an Internet provider, and its browser cannot compare with others. You can say that AOL has facilitated the entry of many people into online services and that those who want its content and the convenience of an Internet connection may well enjoy it. But don't say that pricing is one of its finest features.

MARILYNN LARKIN
via the Internet

BEST OF THE REST

Your choice of the Turtle Beach Tropez sound card as one of the best products of the year (January 9, 1996) is a threat to your credibility because the product lacks support for Windows 95. How did this one slip through your testing? I returned mine and bought a Creative Labs Sound Blaster. The sound is almost as good, and it has been trouble-free.

ALAN NAGEL
via PC MagNet

You picked the Iomega Zip Drive as one of the best removable storage devices. Why? Nowhere in the brief review was the obvious comparison to the SyQuest EZ135 Drive made. Compare the Zip Drive's abysmally slow 29-ms access rate with the EZ135's 13.5 ms. It doesn't take a Rhodes scholar to figure out that more speed and more space make the EZ135 the clear favorite.

CHAD HARGIS
via the Internet

I always enjoy seeing what the press thinks are the best products of the year.

I find *PC Magazine* an outstanding source of usable data, but after reading the Best of 1995 issue, I'm in doubt. I think your position on the Diamond Stealth64 series of video cards was way off. The card is beautifully made and snapped into my Pentium's PCI slot smoothly, but there were no Windows 95 drivers. Since all of my computers now use Windows 95, that was important to me, and I feel you did not evaluate this product adequately.

KELLY HILL
via PC MagNet

I always enjoy what the press thinks are the best products of the year, because that makes it easy to see where the marketing dollars are coming from. To say that Windows 95 is the operating system of the year is not even funny. And your Person of the Year award (December 19, 1995), to a group from Microsoft that didn't even meet its design objectives, sums up the quality of the awards as a whole.

RON LAMB
via the Internet

SOUND ALTERNATIVES

I'm writing in response to your January write-up "Speakers: The Sound and the Fury" (January 9, 1996). Toss out the Recoton speakers and use only the Recoton cordless headphones. If you split the line output, you get the best of both worlds: the three-piece Altec Lansing speaker system on one output and the Recoton transmitter on the other. It works out very nicely.

DR. RON LECHNER
via PC MagNet

I found your speaker article to be very good. However, I didn't see any mention of an intriguing alternative such as a mixer for use with one's main stereo system. At home and at work, I use a Radio Shack four-channel mixer. With a couple of banana plugs to RCA adapters, you can listen to your favorite music and your computer at the same time and adjust the volume of each independently.

GARY S. WINER
via PC MagNet

FIRST LOOKS, SECOND THOUGHTS

In your First Looks review of four CD-ROM add-ons, "Multimedia to Go" (January 9, 1996), I was excited to discover the possibility of a multimedia package for my recently purchased notebook. I only wish the article mentioned whether or not the products reviewed support sound from sources other than the CD-ROM drive.

A.J. ECKEL
via the Internet

The First Looks review "PowerBook 5300c/100: Smaller and Lighter, but Still Seeking a Software Identity" (January 23, 1996) was generally complimentary to a decent product. However, you seem to perpetuate a Wintel marketing myth when you say that the notebook "lags in terms of price and the amount of software available." I don't think that comparable brand-name Intel-architecture portables are that much cheaper. As for lack of software, there are plenty of Macintosh applications, often with cross-platform compatibility from Microsoft, Adobe, Macromedia, Symantec, and many others.

WALTER R. PRICE
via the Internet

After reading the review of the Apple PowerBook 5300c/100, I must admit that I agree with the major point you made about it: It's a nice notebook, but not a great one. However, you're wrong about the software for the notebook and for PowerPC-based Macintoshes in general. Any PowerPC-based Mac is able to run nonnative Mac software.

KAR MUI
via the Internet

TO UPGRADE OR NOT

Your letters to the editor (January 9, 1996) all seem to suggest that Windows 95 is as easy to install as a cork in a bottle. My experiences started with a 3-hour installation on a 486 with 8MB of RAM. After three lockups with what they call a Wizard, I still couldn't get Windows 95 to run until I had pulled every card individually and then deinstalled WordPerfect and Norton pcAnywhere. One migraine and a

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Letters

bottle of aspirin later, I drop-kicked Windows 95 into the wastebasket.

CYRIL M. GOSTITCH
via the Internet

As a professional, I could see every reason for upgrading to Windows 95. But as a consultant, I found the most compelling reason for advising enterprise clients not to change before they have to in Jim Brooker's letter (January 9, 1996). He wrote, "I spent the last five days just exploring the new operating system, and I'm already starting to feel very comfortable with it." If you've got 10,000 employees wasting 4 percent of their working year just exploring the basics of their new toy, then you might as well fire the same percentage. That'll let you buy portables for the survivors so they can drool over the system at home.

BERNARD COHEN
Cormeilles, France

SOFTWARE VIEWS

I was amazed to read the recent reviews of personal finance software ("Personal Finance: Banking on Your PC," January 23, 1996). At no point in the article did I even find the word *bug* mentioned, and yet I and many others can testify to the poor quality and reliability of Quicken Deluxe 5 for Windows (the Editors' Choice). Even with the latest 5.0e patch installed, you need only look at the Intuit Forum on CompuServe to read a variety of horror stories concerning this software. It would be nice if *PC Magazine* attached more importance to bugs and software reliability.

TIM HILL
Kensington, California

HOW TO CONTACT US

We welcome your comments and suggestions. Please send Letters to the Editor via

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COMPUSERVE 72241,104, or to individual editors as listed on ZD Net (type GO PCMSTAFF)

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MAIL Letters, *PC Magazine*, One Park Ave., New York, NY 10016-5802

All letters become the property of PC Magazine *and are subject to editing. We regret that we cannot answer letters individually. To send submissions for PC Solutions, please see the sidebar "How to Contact Us" on the second page of that column.*

CORRECTIONS AND AMPLIFICATIONS

The phone number for V Communications that appeared in our answer to the first PC Solutions question on page 244 of the February 20, 1996, issue, "Multiple Operating Systems Without Pain," is incorrect. The correct numbers are 800-648-8266 and 408-296-4224.

Editor's note: For more information, turn to the Second Looks article "Death, Taxes, and Software Bugs" in this issue.

I like your software reviews. For the products selected, there is more detail and they are more intelligently analyzed than in other magazines I've read. The trouble is, you rarely review the ones I am interested in. I would like to have seen some information on other programs like In Charge or Check+. I'm not trying to make this a platform gripe; I'm just starved for information.

KEITH J. OSWALD
, via PC MagNet

WHERE'S KEN?

Your "Special Report: Is Barbie's Workplace an Ergonomic Disaster?" (Abort, Retry, Fail?, January 23, 1996) was brilliant and wonderful. Give us more, more, more of this. We all take these silly machines too seriously.

STEVEN SALEMI
Santa Fe, New Mexico

A PORTABLE FEAST

In reference to Bill Howard's editorial column "The Well-Equipped Road Warrior" (January 23, 1996): The suggestion of connecting to the handset of a digital phone is ingenious, though the handset has to be analog for it to work. I made a simple adapter at home for less than a dollar that works quite well with my analog phones at home. The parts are available in any store that sells phone equipment.

HOWARD COHEN
via PC MagNet

Howard's statements about the weight of laptop accessories were very well taken: Finally someone has exposed the weak points of portable computing that are never mentioned in notebook reviews and ads. Howard's suggestion for a universal adapter (please make it auto-switching) is very timely and should be a top priority for companies making portable equipment. If they can standardize laptop batteries, then they can do the same with adapters.

ROGIER GRUYS
Spirit River, Alberta, Canada

PERFECT TIMING

Your comparison of CD-ROM drives (January 23, 1996) couldn't have come at a better time. I was in the process of searching for a new unit to replace my old 2X drive and was torn between IDE and SCSI drives. After reading your article I purchased a Plextor 6 PleX based on your recommendation; I found the unit very attractive in price and simple to install. The only complaint I had was the lack of the proper cable to connect the unit to my old sound card, but one call to Plextor's technical support put me on the right path. Thanks for your informative articles, and keep up the good work.

JACK EGAN
via the Internet

RAM SCAM

I'm writing concerning the Trends article "SoftRAM Under Scrutiny" (January 23, 1996). A couple of years ago I read that a majority of PC owners didn't even know how to copy a file to a disk. I'm not surprised, then, to learn that over 700,000 copies of SoftRAM have been sold. What surprised me was how long it took *PC Magazine* to discover the controversy.

WAYNE LANKFORD
Birmingham, Alabama

CD-R: BOON OR BUST

In his column "And a CD-R Drive on Every Desk. . ." (January 23, 1996), Jim Seymour lauds the CD-ROM drive and describes its many advantages. While I agree that the proliferation of CD-ROMs makes CD-R look promising, in the end I think it will end up a dead technology or a middling standard that everyone uses but grumbles about constantly. As with VHS and Windows, everyone knows there are better technological alternatives. Just about everyone agrees Beta videotape was a better format; just as many agree there are better operating systems than Windows. I fear this is the way it will be with CD-R.

CHRIS WHITE
Charleston, South Carolina

TIPS AND TRIBULATIONS

I recently followed the advice in User-to-User on how to install Windows 3.1 on Windows 95 and create a shortcut ("Dual Windows Without Dual Boot," January 23, 1996). Let me tell you, it works great! It was explained in such detail that I had no fears of doing it.

DAVID G. KALBFELL
via the Internet

While I appreciate the in-depth information you provide, I was disappointed with Branco Medeiros's tip (User-to-User, January 23, 1996). "Protecting Program Manager Settings" sounded like a great solution, but I found the example very difficult to follow.

NIGEL EDWARDS
Trenton, Ontario, Canada

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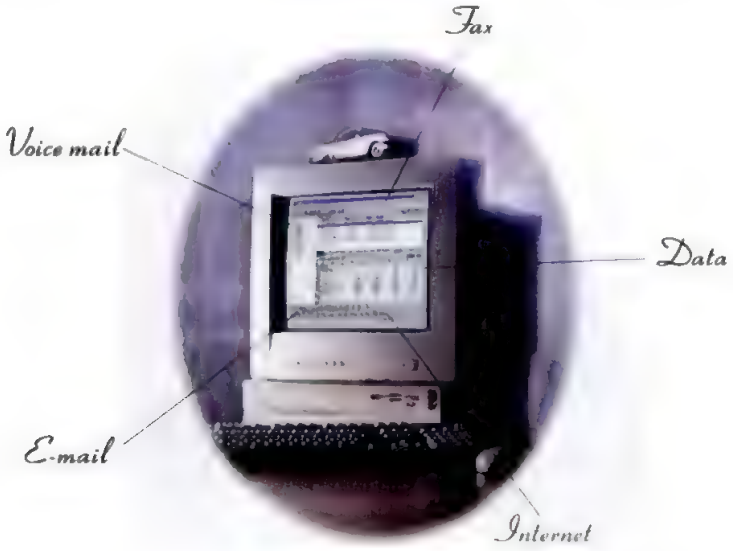

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MICHAEL J. MILLER

The Three-Piece PC

Remember that first desktop PC you bought? If it was "IBM-compatible," it almost certainly looked a lot like the original IBM PC, introduced 15 years ago. It had three major components: a keyboard, a monitor, and "the system" itself—a box containing the motherboard, drives, and expansion slots.

Now take a look at the home computers reviewed later in this issue. They still look pretty much the same. So, in fact, does just about any desktop computer. Yes, the processors have gotten much faster, the drives hold more data, the expansion slots do a lot more, and the traditional desktop case has been replaced by a smaller box or a minitower. But it's still the same three pieces: monitor, keyboard, and computer. OK, now we've added a mouse. Big deal. True, a few of the newest products look a bit nicer. The Acer Aspire, for example, boasts designer colors and sleek curves. It's nice to look at, but underneath it all, it's still just a pretty face on the same basic idea.

It doesn't have to be that way. Just look at the evolution of the portable computer, which, 15 years ago, was the size of a sewing machine and had to be plugged in. That early model was replaced first by a lunch box–sized machine and later by the now-familiar notebook with its clam shell design. And we've seen a variety of personal devices (such as PDAs) of all shapes and sizes.

PHOTOGRAPH BY ANDY FREEBERG

BREAK THE MOLD

The three-piece design has worked well. Still, there has to be a better way, particularly at home.

Desktop PCs should change too. And they will. In fact, the first personal computers did look different from the current three-piece arrangement. The Radio Shack Model 1 that I bought 19 years ago was an all-in-one design that looked more like a typewriter with a screen. The Apple II and the Commodore 64 combined the CPU and keyboard. Later, the Macintosh popularized the monoputer, a combined monitor and CPU with external keyboard—a design still popular in other parts of the world. But in the U.S., the desktop PC still looks the same. Admittedly, the three-piece design is comfortable and flexible, and it has worked well for us. Still, there has to be a better way, particularly for the computer at home. And it looks like we're about to see it.

The most obvious example is the new Gateway Destination series, which is designed for a living room. It includes a 31-inch monitor that also displays television signals, and it works with a wireless keyboard and remote control device. The Destination series looks more like high-end A/V equipment than a computer. I'm still a bit skeptical because I haven't used a shipping unit yet, but the concept is appealing.

More changes are taking place with the input devices we use. Compaq and Fisher-Price are designing input devices for kids that look more like steering wheels or giant trackballs. Someday, someone is going to integrate such devices into home PCs. Already, Compaq has a combination scanner/keyboard, and HP is integrating a photo scanner in some models. Another area of innovation is in the designs for so-called Internet terminals from companies such as Japan's Bandai, Oracle, and Sun. These tend to be much smaller than PCs and look like cable set-top boxes.

Home PCs are ripe for change. I can envision a smaller, less obtrusive PC in the kitchen serving as a family scheduler, phone book, and intelligent answering machine. But it will have to be a lot cheaper and easier to use than a typical PC.

In the future, we will all have multiple computers at home. Some will perform traditional computing tasks, while others will be used mainly for games, communications, controlling other devices in our homes, and other purposes. It's quite likely that all these PCs will be tied together somehow, perhaps using wireless technology, something like Novell's embedded systems approach, or a more traditional networking approach. The era of the home hub may be coming, but we know one thing: The technology has to be far simpler, maintenance-free, and nearly invisible to typical users.

Actually, depending on how you look at it, most of us already do have multiple specialized computers at home already. Computers control most of the electronics in our homes and cars. Just recently, the computer in our oven crashed and the motherboard had to be replaced. It kind of makes you wonder. But, in general, the expansion of computers into everyday life is a good thing. Although, to be successful, PCs must fit better into our homes.

To achieve this, the three-piece design eventually may go the way of the three-piece suit. It was fashionable once, and it may even remain popular in some offices, but you wouldn't really want to wear one at home. □

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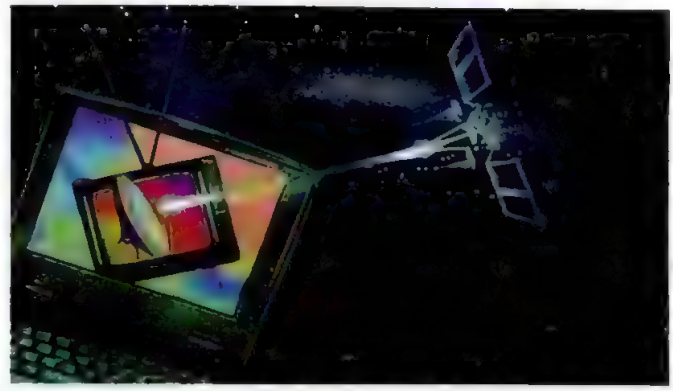
CIRCLE 183 ON READER SERVICE CARD

Trends

TRENDS & TECHNOLOGIES SHAPING THE PERSONAL COMPUTER MARKET

Satellite PCs

Multimedia turns skyward.



Work is now under way on several fronts to bring TV programming, enhanced data services, and even some of the Web to PCs outfitted with the right hardware and software for receiving satellite broadcasts.

Microsoft's decision to team up with DirecTV, a division of Hughes Electronics, is the latest indication that the wheels are turning. Microsoft plans to announce soon the PC manufacturers that will support the technology. The new PCs, expected by year's end, will have hardware that works with DirecTV's 18-inch satellite dishes to receive digital broadcasts of 175 channels—as well as enhanced data services, online magazines, and Web sites.

The service, which will cost about $5 to $10 per month, is not designed to replace other high-bandwidth technologies such as cable modems, but it is expected to fuel a new wave of creative content from the TV and software industries. "It's pretty clear to us that one of the things that will become commonplace in the next few years is the ability to receive entertainment products such as DirecTV on PCs," says Craig Mundie, senior vice president of the consumer platforms division at Microsoft.

Microsoft is now developing hooks in Windows 95 that will work with the receiver/decoder equipment built into PCs. It's also creating a set of programming specifications for card manufacturers and software developers.

DirecTV, which currently transmits TV programs to 1.3 million U.S. households, has three satellites in orbit and has reserved bandwidth for future applications. The basic service will offer TV programming to home PCs. Other services will include data overlays—like stock quotes or sports statistics—to enhance TV programming, video- and audio-rich multimedia magazines, and information from selected Web sites. It's not designed, however, for heavy-duty Web access.

Microsoft plans to work with producers of Web content and multimedia titles as well as TV producers to develop new kinds of material. Though the working target is the end of year, the project entails considerable coordination with content producers and hardware manufacturers. The real ramp-up is expected next year.

The Microsoft-DirecTV alliance is not the first effort to broadcast data to PCs. Intercast, an alliance of giants from the TV, PC, and software industries, will use TV signals to deliver Web-formatted content from CNBC, CNN, MTV, NBC, VH1, and QVC. As for future content, the sky's the limit.—*Carol Levin*

Internet in Your Living Room

Hearst details plans for @Home's cable connection.

The parallel between the high-speed delivery of McDonald's french fries and the high-speed delivery of Internet content is all too clear to William Hearst, chairman of @Home and former editor-in-chief and publisher of the *San Francisco Examiner*. Hearst recently detailed @Home's telephone-bypass strategy "for high-speed, cable-based Internet access at home."

"Cable currently has pipes set up to deliver video, but the cable providers are clearly focused on turning those pipes into a new communications medium," said Hearst. "We're going to provide a big backbone on top of which the regional cable companies can provide high-speed Internet access to homes."

Milo Medin, formerly of NASA, is in charge of implementing @Home's daunting network management plans, which call for minimizing traffic across the backbone through caching, data-replication, and serving one Ethernet port in each home that connects multiple PCs.

The launch of the service, which will cost around $30 per month, is scheduled for later this year; testing is now under way in Sunnyvale, California.

Skeptics of @Home's strategy question the ability of cable companies to provide the quality of service needed for Internet delivery. "We favor the McDonald's approach of building a big service company around employees who don't necessarily have the greatest skill sets," said Hearst. "We have to identify what's complex about service provision in the home and then invent ways to address it effectively—along the lines of the custom french-fry scoop at McDonald's." Lack of accountability is one of the biggest problems with Internet service provision, he added.

@Home will work with Netscape Communications on a customized version of Netscape Navigator. @Home will provide directories of content and encourage developers to create Java applets that deliver local information to homes.—*Sebastian Rupley*

ILLUSTRATIONS BY JEAN-FRANCOIS PODEVIN (TOP) AND LESLIE NEWMAN (BOTTOM)

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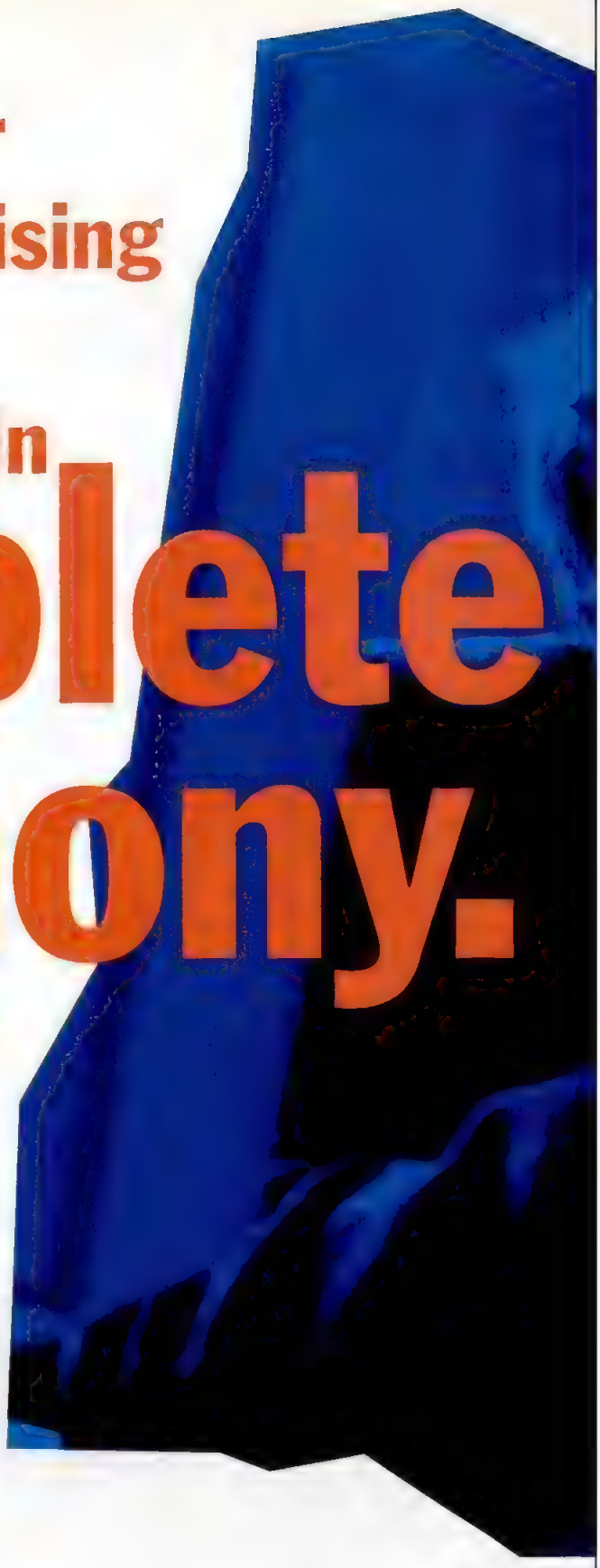

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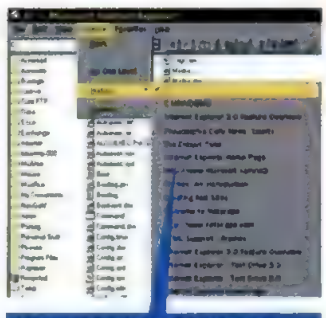
Microsoft Charts Net Course...

ActiveX takes on Java; Internet Explorer heads for AOL.

In the opening keynote address at Microsoft's recent Professional Developers' Conference, Paul Maritz, vice president of the Microsoft platforms group, drew a road map of the company's Internet strategy. Chief among the announcements was the unveiling of the ActiveX platform, which competes directly with Netscape APIs and Sun Microsystems' Java and JavaScript.



Internet Explorer 3.0 lets you jump to the Web and your files.

ActiveX is a cross-platform strategy with the stated goal of "moving us from the world of static Web pages to active online content." Other announcements discussed Internet Explorer 3.0, due this summer; several ActiveX controls supporters; a digital signature initiative; a licensing agreement for Sun's Java language; and an agreement with Progressive Networks for delivering video and audio on the Web.

Maritz compared the early stages of the current "communications revolution" developing around TCP/IP and the Web to the early stages of the PC revolution, built around DOS and spreadsheets. The portion of the keynote speech that got the most favorable audience reaction—other than a demo from Steve Jobs using his Web Objects software with Microsoft's ActiveX controls—was the demonstration of Internet Explorer 3.0. This new version combines Internet Explorer's interface with Windows 95's Explorer interface.

Borderless frames create slick pages.

ActiveX creates interactive Web pages.

Microsoft's Bill Gates and America Online's Steve Case also confirmed that that they'd achieved a far-reaching strategic alliance. AOL has agreed to make Microsoft's Internet Explorer the standard, built-in Web browser for its more than five million customers. In return, Microsoft will give Windows 95 users access to America Online by incorporating it within an "online services" folder found directly on the Windows 95 desktop.

Gates said that other online services could be expected to show up as icons on Windows 95's desktop as well.—*Sebastian Rupley*

...Rivals Predict Sea Change

Netscape, Sun point to end of Microsoft's lock-in strategy.

In a keynote speech in front of a packed house at San Francisco's Netscape Developers' Conference in March, Sun Microsystems' Eric Schmidt painted a picture of an Internet-, intranet-, and Java-dominated future that he said could topple the client/server model and seriously threaten the Microsoft/Intel–dominated PC platform.

Schmidt positioned 1996 as the crucial period within which Netscape and Java can establish a meaningful new computing platform. "Microsoft will tell you there's no major paradigm shift," he said, "because they just want to extend incrementally what already exists." He referred to Microsoft's dominance as being based on "API lock-in strategies," and painted a picture of "a simple, virtually bug-free future operating system that sits and waits for components to arrive over a central network." The OS would outrule lock-in strategies designed to keep one vendor dominant, said Schmidt.

SIMPLE SERVER: *Netscape's FasTrack Server, with its simple interface, is targeted at those without much experience managing a Web server.*

Schmidt also focused on solutions to existing bandwidth problems and bottlenecks. Cable modems—as opposed to "unfriendly" ISDN—figured large in his perception of the Internet's future. He pointed to promising cable-modem trials in Sunnyvale, California, and described the guts of the typical cable as consisting of a television line for NTSC video signals, a second phone line, and an RJ45 plug for 10Base-T Ethernet.

Sun's Java, of course, was central to Schmidt's vision. "HTML content is static," he said, "but Java will change the paradigm by replacing static data with live applications and interactive multimedia." He applauded recent developments designed to accelerate Java.

"The biggest complaint we've had about Java is that it's an interpreted language," he said, but "a new breed of just-in-time compilers will speed things up by compiling on the fly." He singled out Borland's new C++ development suite as a prime example, and also said that Sun's PicoJava and MicroJava accelerator chips would be available by summer.

The crowd at the conference and Schmidt's speech reflected a distinctly anti-Microsoft theme. In an apparent reference to both Microsoft and IBM, Schmidt said, "We've had forty years now of one vendor dominating computing, and a new platform which outrules API lock-in strategies could change that."—*Sebastian Rupley*

Top Business Software

1. **Microsoft Windows 95 Upgrade** Microsoft
2. **Microsoft Plus! for Windows 95** Microsoft
3. **Netscape Navigator Personal Edition** Netscape Communications
4. **First Aid** Cybermedia
5. **CleanSweep 95** Quarterdeck
6. **VirusScan** McAfee
7. **Uninstaller** MicroHelp
8. **QEMM** Quarterdeck
9. **Norton Antivirus** Symantec
10. **Remove-It 95** Vertisoft

Source: PC Data. Data for January 1996. Additional lists at http://www.zdnet.com/pcmag/topten/topten.htm.

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End of the Line for NexGen

Parent AMD turns its attention to K5, K6, and beyond.

Faced with significant threats from both the Cyrix 6x86 and the imminent Intel P55C, Advanced Micro Devices (AMD) has discontinued the NexGen Nx586 to focus on the development of its 5K86 processor and its true sixth-generation chip, the K6. Although the Nx586 was the first fifth-generation Intel competitor to market, its uncommon bus design and reliance on a third-party manufacturer have moved the entire NexGen engineering staff under the AMD name.

After leading its competitors in sales of inexpensive alternatives to the Intel 486, AMD initially entered the fifth-generation market via its 5x86 chip, which shared a moniker with a Cyrix competitor. The 5x86, however, is simply a glorified fourth-generation processor; although it runs at 133 MHz, it requires a 486 socket and, at best, delivers the performance of a low-end Pentium.

AMD's true fifth-generation effort is the 5K86, which has experienced significant delays since it was first trumpeted as the K5. Unlike past AMD processors, the 5K86 has a proprietary design, is fully compatible with the Pentium P54C socket, and delivers Pentium-level performance. AMD is manufacturing the 5K86 at its new plant in Austin, Texas, and recently rolled out 75- and 90-MHz versions. These chips will carry P75 and P90 P-ratings, respectively, matching Intel competitors clock for clock. Upcoming clock speeds, however, will be more adeptly tuned and achieve the performance of much faster Pentiums. The 120-MHz 5K86, for instance, will have a P150 rating.

With this 5K86 on the horizon, the Nx586—of which AMD was in possession after its merger with NexGen—became expendable. Although this chip was the leading fifth-generation Intel alternative, its low-end Pentium performance was not enough to outweigh its negatives. Not only was it manufactured at an IBM plant rather than at the AMD plant, it could not be plugged into a Pentium socket. Its unique bus design required the expense of both proprietary chip sets and motherboards.

NEXT PROJECT: *AMD recently moved NexGen engineers onto the 5K86 and its successor, the K6.*

Consequently, the Nx586 has been discontinued and all of NexGen's California-based engineers have been moved to AMD's K6 project, formerly the Nx686. Texas-based AMD engineers, meanwhile, will remained focused on both the 5K86 and begin work on a seventh-generation processor. With the Cyrix 6x86 delivering Pentium/166 performance and the upcoming Intel P55C speeding up audio and graphics, AMD can't start too soon.—*Cade Metz*

The Phone in the PC

Computer telephony software talks back.

If the computer telephony business were the graphics card business, the companies that showed their wares at the Computer Telephony Expo in March would have just moved from 9-inch black-and-white monitors to 14-inch color. And they all expect spectacular 21-inch monitors to be just around the corner.

Computer telephony is about receiving information over the phone—in which case the PC must talk like a human—and about controlling the phone from the PC—in which case the PC must communicate as a phone. It's also about instructing the PC to complete certain tasks in response to information delivered over the phone, such as leading callers through a menu tree to get information.

Computer telephony products have been in big corporate call centers for years, but Microsoft is now making it easier to equip small offices with telephony functions. The telephony tools for Visual Basic can make practically anyone into a telephony programmer. Parity Software, Pronexus, Stylus, and Voysys have products that add telephony toolbars into Microsoft's Visual Basic.

Wildfire Communications has one of the hottest telephony products to hit the market. Wildfire is a software package that listens in on your phone calls and responds to voice commands to find a phone number, add a person to a conference call, play voice mail, or read e-mail. Since Wildfire calls, connects, and disconnects by voice commands, it beats the daylights out of finding the buttons on a car phone or remembering arcane strings of PBX call-control commands. (Call 800-945-3347 to test a demo.)

NetPhonic Communications (415-962-1111) has developed Web On Call Voice Browser, an innovative product that can work on a corporate intranet's Web server. Web On Call uses text-to-speech technology and Teleprompting, an audio recording feature, to read HTML files aloud to incoming callers. When the software hits an embedded link to another location, the caller hears a beep, at which time the caller can push the # key and make the jump. It can also transmit selected pages to fax machines.

In April, Microsoft Phone will be bundled with the Creative Labs Modem Blaster, which will enable features like Caller ID and custom answering systems. And it's rumored that Microsoft Phone will be in the next release of Windows 95.—*Frank J. Derfler, Jr.*

PC Magazine Online Events

WWW.PCMAG.COM. Remember to visit **Newswatch** at our ever-growing Web site for quick summaries of late-breaking computer news from industry publications. From April 15 to 19, join *PC Magazine* project leader Jay Munro in a **Web Discussion** about browsers. From April 22 to 26, NCSA's Dr. Richard Ford and reviewer Keith Schultz will host a discussion on antivirus software.

PC MAGNET. From this online service of ZD Net available through CompuServe (GO PCMAGNET), you can download *PC Magazine* utilities (GO TIPS) and join in freewheeling discussions about new products in *PC Magazine*'s Editorial forum (GO EDITOR). **First Looks Plus:** From April 29 to May 3, discuss US Robotics' Palm Computing Pilot 1000 PDA with Palm vice president of marketing Ed Colligan and *PC Magazine* executive editor Rick Ayre. **Features Plus:** From April 22 to 26, join representatives from the makers of UnInstaller, CleanSweep 95, and Remove-It 95 for a discussion of uninstallers. *PC Magazine* contributing editor Ed Mendelson hosts.—*Tim Albano*

ILLUSTRATION BY ROB WESTERBERG

PIPELINE

By Jake Kirchner

On the Web, You Get What You Pay For

Every Web surfer's dream is free access to free information. But even as Internet access costs spiral downward, in the face of increased competition, the cost of producing content that attracts large numbers of viewers continues to rise. As those of us who have invested large sums in our Web sites can attest, real content costs real money. The result is an unmistakable trend toward subscription-supported and pay-per-view models for the best information on the Web.

The exceptions will be the relatively few sites that are successful at attracting significant advertiser support. Unfortunately, there just aren't enough ad dollars to support all the sites already trolling for ads. Even phenomenally successful sites (in terms of hits), like search services Lycos and Yahoo!, currently pull in less than a million dollars per month in ad revenue. Not bad, but still insignificant in the grand scheme.

Furthermore, since the overwhelming majority of Web ads are from the computer industry (and are primarily Web-related), the content providers most able to obtain those ads are the media companies already in those markets. The adoption of the Web as a medium for mainstream advertising will be gradual. And the total pot of all ad dollars doesn't grow quickly enough from one year to the next to support all the current forms of media—print, broadcast, direct mail and so forth—let alone the thousands of new Web sites hoping for advertiser support.

It's no surprise that the Web sites of media giants are subscriber-supported.

So it's no surprise that the Web sites developed by mainstream media companies—such as Dow Jones and Co., ESPN, Knight-Ridder, and The New York Times Co.—are, either entirely or in part, subscriber-supported services. *WebWeek* recently reported on a Kelsey Group survey that found that 26 percent of online daily newspapers and 56 percent of online weekly newspapers plan to charge subscription fees.

I suspect many of us would be happy to forgo the pleasure of advertising on many of our favorite sites. Although being able to link directly to the advertiser's own site is potentially a real benefit to online ads, no one likes the annoyingly prominent placement of the ads (necessitated by the small amount of space available for content, much less commercial messages). One of the worst offenders is the pointcast network, an otherwise truly interesting news service, which insists on flashing ads at you as you try to read the content. Imagine trying to watch an NFL game on TV while beer ads flash at you nonstop from the center of the screen.

For longtime Internet users, the commercialization of the Web is one of the really disappointing developments of the past couple of years. Still, on the plus side, access costs are dropping. AT&T's decision to offer free Internet access to its long-distance customers, for example, will help drive down access costs for everyone as competitors scramble to keep up. And a variety of high-speed network access technologies are becoming more widely available, foreshadowing a drop in those prices as well.

Who knows, maybe we'll save enough in access costs to be able to pay for the content that makes the access worthwhile.

Fusion, Ferroelectric, and Fast

Memory breakthroughs promise cheap speed.

Amid the frenzy stirred up by the Internet, some important technologies aren't getting the attention they deserve. One good example: the memory expected to handle all the cool multimedia applications the Web is going pump into your PC over high-bandwidth connections. Several manufacturers have been working on memory chips that are up to the task.

IDT, a longtime player in the memory chip field, has developed fusion memory—so-called because it combines the low cost of DRAM with the high performance of SRAM. Fusion chips pack more bits on a single chip than SRAM and can access data nearly as fast as SRAM. IDT predicts fusion will replace SRAM chips over the next few years.

The memory interface design, chip-fabrication process, clock rate, and density of bits per chip determine the speed at which data can be fetched from memory; that speed is known as access time. DRAM is the slowest, averaging 50 to 70 nanoseconds. SRAM, significantly faster, has access times of 5 to 15 ns. Fusion clocks in at 10 to 20 ns. Fusion memory also requires less power than SRAM, making fusion appropriate for battery-conscious notebooks.

ILLUSTRATION BY DAVID BAMUNDO

NEC is testing another fast replacement for DRAM called ferroelectric memory (FeRAM). FeRAM is designed with flash memory, so the chips retain data when the power is cut. NEC expects FeRAM chips to debut commercially in three years.

Meanwhile, Rambus, which has been pushing its own revolutionary memory technology—targeted at the video card market—for years, has recently solved a big deficiency in that technology. Its latest design of Rambus DRAM (or RDRAM) can transfer data at 600 MBps—two to three times as fast as the data transfer rates of typical video memory—while RDRAM chips excel at the rather orderly task of streaming video. Until recently, RDRAM exacted a stiff performance penalty when dealing with other types of data that required more complex use of the memory chip, such as random access. Later this year, newer versions will reduce latency significantly, opening opportunities for high-speed applications.

But developing the technology is only part of the challenge. A sweeping transition to new technology requires building the support of vendors and manufacturers. IDT says it has the support of chip-set vendors, and it expects a transition to fusion memory within the next 12 months. And Chromatic Research, Cirrus Logic, Nintendo, and Silicon Graphics have announced systems using Rambus technology.—*Carol Levin*

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The U.S. Robotics Sportster is the fastest, most reliable modem you can buy. For compatibility, connectivity and cumulative throughput, the Sportster proved to excel well beyond its nearest competitors in two separate and equally uncompromising independent lab tests. And during this incredible comparative exhibition, it not only outperformed other 28.8 Kbps modems, it outperformed the ratified standard for speed by working beautifully in a 33.6 Kbps mode.

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First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

DIGITAL PHOTOGRAPHY

Minolta's RD-175: The Professional's Choice for Electronic Photography

By Daniel Grotta and Sally Wiener Grotta

The $9,995 Minolta RD-175, from Minolta Corp., is the first midrange digital camera to dip below a five-figure price tag—albeit just barely—yet produce stunning high-resolution 24-bit color images. The RD-175 is a good choice for computer users who need professional-quality digital photographs for publication, whether on the World Wide Web or in print.

The RD-175's specifications are impressive compared with those of the $12,780 Fujix DS-505 (also sold as the Nikon E2) and the $11,995 Kodak EOS DCS 5. The RD-175, which is based on the body of the Maxxim 500si camera, is both smaller and lighter than the boxy DS-505 and the elongated DCS 5. Its 1,528-by 1,146-pixel resolution yields more detail than the DS-505's 1,280-by-1,000 and the DCS 5's 1,524-by-1,012 images.

The RD-175 is the first camera to use a beam splitter and three linear charge-coupled device (CCD) targets (two green CCDs and one combination red-and-blue CCD). The primary advantage of this arrangement is that the three medium-resolution CCDs are easier to make and less expensive than a single high-density CCD. The three-way approach also yields better separation of the three color channels that constitute an image, which virtually eliminates color aliasing, or imperfectly aligned colors.

The RD-175 uses a 131MB Type III PC Card hard disk to hold up to 114 images. This is a slightly higher capacity than the DCS 5's 105MB Type III PC Card, which can store 62 images, or the DS-505's 25MB Type II PC Card, which can hold 84 images. The RD-175 produces the largest image files (5MB), the DS-505 produces 3.7MB files, and the DCS 5 produces 4.5MB files. The penalty is that the RD-175 takes 4.5 seconds to get ready for its next shot. The DCS 5 can shoot a burst of up to ten frames in a little over 4 seconds, and the DS-505 can click off a

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POINT AND SHOOT: *Minolta's digital camera, the RD-175, is light and easy to operate.*

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GRAPHICS ADD-ONS

Kai's Power Tools 3 Sets Graphics Editing in Motion

By Luisa Simone

Kai's Power Tools 3 is like a multivitamin that adds nourishment and energy to your image-editing program. This $199 collection of filters from MetaTools (formerly HSC Software) boosts the power of the host illustration or image-editing program so much that it's often hard to recognize the original software.

This third iteration of Kai's Power Tools (KPT 3) continues to deliver an amazing assortment of Adobe Photoshop Plug-in filters but now runs natively in Windows 95 and Windows NT and adds a new miniapplication called the Spheroid Designer. The bottom line is that whether you're generating a shiny blue marble or a red sand-dune planet, you'll find the Spheroid Designer can take you as far as your creativity can go.

The flexibility of KPT 3 is unprecedented. For example, you can independently set up four light sources (five if you count ambient light) to shine at different intensities, with various colors and customized highlights. You can even set up the program to pull color from a globe rather than illuminate it, producing an intriguing effect not unlike that of a black hole.

The realism of the three-dimensional effects created is enhanced by the ability to assign bump maps to surfaces. You can also control the concavity and transparency of an object.

KPT 3 has also made the leap from still imagery to moving images with the addition of

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FACING FACTS: *Several filters, like the new Vortex Tiling effect shown here, make use of a new interface and preview window.*

Minolta RD-175

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frame every second.

In addition to swappable PC Cards, these cameras have alternative ways to move images to your PC. The DS-505 communicates through its RS-422 video port, the DCS 5 has a SCSI interface, and the RD-175 has a SCSI-2 interface.

Just turn on the RD-175, compose your picture, and shoot. The camera is light and well balanced, and because it uses an optical condenser, you see a full frame through the viewfinder. The DCS 5 awkwardly displays the image on a smaller frame at the center of the viewfinder.

The downside of using a viewfinder condenser is that the RD-175's maximum aperture is f6.7, which allows relatively little light into the camera. The RD-175 compensates by using a very light-sensitive target that is the equivalent of ASA 800 film, and it is the only camera in its class with a built-in flash.

WALKING THE DOG: *The RD-175's desktop (top) lets you off-load your photos via a PC Card or through its SCSI-2 interface. Image quality (right) was excellent over a range of subjects and conditions.*

At first we had difficulty warming up to the camera. The autofocus mechanism responds slowly, and the focus appeared imprecise. In any event, all our images were perfectly sharp. Another irritation is that the mirror return is slow, but in view of the camera's slow recycling time, this is not a practical consideration. It isn't difficult to use the camera in the shutter/aperture priority or manual mode, but the status readouts are not visible in the viewfinder. Finally, the PC Card hard disk uses the standard ATA format, but the SCSI-2 interface requires a special cable.

In spite of its high-end aspirations, the RD-175 lacks metering and focus modes, high-speed flash synchronization, fast manual operations, and professional-quality interchangeable lenses and accessories.

Minolta's driver installs into any 16-bit Twain-compliant graphics program; it does not work in Windows 95 or Windows NT. The images are in a proprietary format, and on our 486DX2/66 test system with 16MB of RAM, it took an average of 2 minutes 56 seconds to acquire and decompress each image. An added bonus is that shutter speed, f-stop, flash, and time/date information are automatically stamped on each frame.

The images from the RD-175 camera were consistently among the best we've seen. Edges were sharp, and colors were vivid and realistic, especially with difficult-to-reproduce flesh tones.

The Minolta RD-175 strikes an elegant balance between excellent image quality and minor quirks that distract from an otherwise well-designed digital camera.

Minolta RD-175. List price: $9,995. Requires: 16MB RAM, 30MB hard disk space, Microsoft Windows 3.1 or later, SCSI-2 host adapter with driver or Type II slot. Minolta Corp., Ramsey, NJ; 201-825-4000; http://www.minolta.com. *Circle 438 on reader service card.*

Epson's PhotoPC Keeps It Simple

Bucking an industry trend toward smaller, more sophisticated filmless cameras, Epson's $599 PhotoPC is larger than most 35-mm point-and-shoot cameras.

Simplicity is the watchword here. All of the controls are clear and unambiguous: an on/off switch on the front of the camera and an information panel on the top with buttons for the timer, selecting high or low resolution, erasing the last picture, and activating the built-in flash. The large frame counter shows both the number of shots taken and those left. The only other icon shows battery status.

The PhotoPC is a basic fixed-focus camera without adjustments for f-stop or shutter speed. But when it's tethered to a PC, you can adjust the shutter speed from 1/30 to 1/10,000 of a second. The lens coverage is about what you'd get with a 43-mm lens on a 35-mm camera, and its equivalent film speed is a slow ASA 130.

Turning the camera on opens up the lens cover. If you don't snap a shot within a minute, the PhotoPC enters a power-saving sleep mode. After each shot, the camera takes approximately 5 seconds to recycle. The PhotoPC can capture up to 16 high-resolution (640- by 480-pixel) or 32 standard-resolution (320- by 240-pixel) images, or some combination of the two, in its 1MB flash memory. Optional 2MB and 4MB flash-memory modules can raise the maximum capacity to 160 standard images.

At about 57K, it takes approximately 16 seconds to upload and decompress each image. Each image is saved as a JPEG file that occupies about 900K. Images are captured at 24-bit color, and all of our test shots were sharp, with good color saturation and fidelity and minimal aliasing.

The PhotoPC's 37-mm lens thread permits the addition of third-party accessories, but there is no provision for viewfinder lenses, so you will have to guess what you're shooting at. The PhotoPC comes with Storm Software's EasyPhoto, which includes image-editing tools for adjusting brightness, color, contrast, cropping, and size.

NEAR AND FAR: *The PhotoPC captures 24-bit images with a depth of field from 2 feet to infinity.*

Epson's PhotoPC is just as impressive as it is inexpensive.

PhotoPC. List price: $599. Requires: 8MB RAM, 15MB hard disk space, Microsoft Windows 3.1 or later. Epson America Inc., Torrance, CA; 800-289-3776; http://www.epson.com. *Circle 439 on reader service card.*

KPT 3

Continued from page 39

automated animation functions. Using the new Interform module, you can create moving textures in .AVI format that can dress up a multimedia presentation.

A FAMILY AFFAIR

Interform is closely related to KPT's now-classic Texture Explorer in that it uses a genetics metaphor to produce a variety of new images. The result is animation that is the offspring of two source (or *parent*) patterns.

The parents are in reality nothing more than Texture Explorer presets. You can alter the direction and velocity of each parent texture, and you can determine how much the "child" will resemble either of its parents.

Animation functions can also be found hidden deep within the Spheroid Designer. A nested module called the Genesis Editor lets you transform your sphere by multiplying it and then arranging the copies in branching or radiating patterns, altering their size, and rotating them in space.

Regardless of whether you create moving textures or spheres in motion, you'll find the movie-production controls simple but effective for creating many different effects. The biggest time-saver is KPT 3's iconic filmstrip, which lets you designate up to ten keyframes of up to 10 seconds each for your animation files.

Completing the list of wholly new functions are several special-effects filters that push and pull a picture's pixels like a fun-house mirror or a kaleidoscope. Indeed, filters such as Planar Tiling, Twirl, Video Feedback, and Vortex Tiling can transform a basic image into an original work of art with the click of a button.

The changes that have been made to long-standing KPT functions are no less impressive. Both the Gradient Designer and the Texture Explorer have been improved with larger preview windows that show how each effect will interact with the current selection. Choosing a Preset effect is also easier, thanks to the addition of thumbnail previews, which show you exactly what a "Giraffe Sportcoat" or a "Cactus Pillow" looks like.

SWIRL-O-MATIC: *The new Spheroid Designer lets you create complex, realistic objects.*

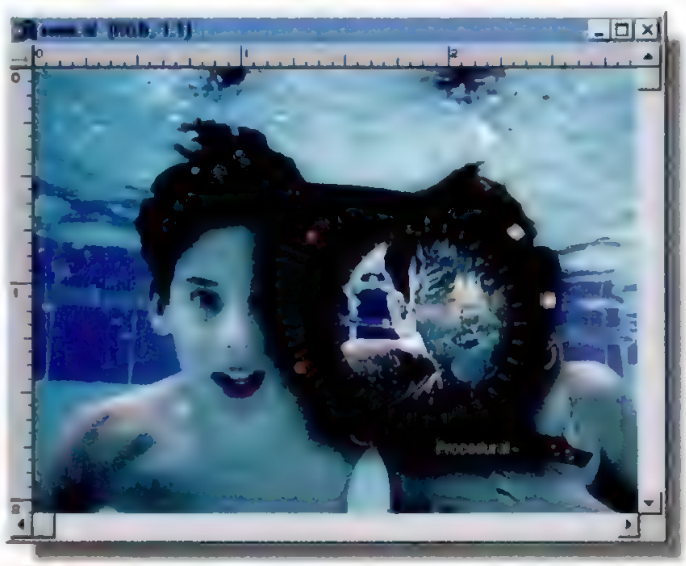
KPT 3 lets you modify gradients and textures to a much greater extent than ever. There are controls for hue, saturation, brightness, contrast, blur, and color cycling.

As good as these changes are, longtime KPT users will likely be disappointed to find that the new Texture Explorer no longer creates repeating patterns and that it relies on totally new algorithms to generate textures. This renders all of your Preset textures from earlier versions unusable in KPT 3.

MetaTools recognizes the importance of these features for digital artists. As a result, this program includes Version 2.1 of the Texture Explorer (and the unchanged Fractal Explorer).

NEW FACE ON GRAPHICS

There are also major changes to the interface. In true KPT tradition, Version 3 eschews menus and dialog boxes in favor of clickable buttons and draggable dials. Indeed, you can often drag directly inside a preview window to alter the angle or intensity of an effect.



AUTO-FOCUS: *A virtual lens, which can be moved to different screen positions, lets you view an image through a special-effects filter.*

To that foundation, KPT 3 adds two entirely new interface elements: a floating control panel (called the Compact UI) and a virtual camera lens (called a Lens f/x). In many cases, these new interfaces consolidate multiple filters into a single tool. For example, the Pixel f/x lens replaces five separate filters from KPT 2.

Still, you get all of the power of the older filters and a little bit extra. From within Pixel f/x, the Page Curl filter lets you interactively pull a page curl of any size from any corner of an image.

The new interface also adds several important options to the filter effects that were previously available only in the Gradient Designer and Texture Explorer. Now you can change an image's opacity and choose an Apply mode (such as a procedural blend) before you apply an effect to an image.

PENTIUM POWER

In the past, KPT has had only one requirement—a host program that supports the Photoshop Plug-in filter specification. KPT 3, however, specifically requires the more robust operating environment of Windows 95 or Windows NT. Our testing also revealed that you'll need a Pentium processor and the latest generation of video adapter to get the most out of the program.

KPT 3 comes on a CD-ROM, which allows MetaTools to include hundreds of preset gradients and textures, a collection of bump maps, and dozens of tips and tricks from Kai Krause, the program's creator. But even without these bonuses, KPT 3 is a great value that can increase your productivity while it enhances your creativity.

Kai's Power Tools 3. List price: $199; upgrade, $79. Requires: 8MB RAM, 10MB hard disk space, Microsoft Windows 95 or Windows NT, host application that supports the Adobe Plug-in specification, CD-ROM drive. MetaTools Inc., Carpinteria, CA; 805-566-6200; fax, 805-566-6385; http://www.metatools.com. *Circle 410 on reader service card.*

ELECTRONIC ORGANIZERS

Pilot 5000: From the Cradle to Your Pocket

By Rick Ayre

The Pilot 5000, a $369 electronic organizer, has an identity problem: It is neither a full-fledged hand-held computer nor a desktop computer accessory, and therein lies its value. Designed by U.S. Robotics, the diminutive Pilot comes with a powerful suite of pen-based organizer applications and has a unique cradle that connects to your PC, making it a snap to keep your data in sync. The more you use it, the more the Pilot becomes a natural extension of your PC.

Though it's no match for the larger Apple Newton or HP OmniGO, the Pilot packs more computing power than a BOSS or Wizard organizer into a near-perfect shape and size. It measures only 4.7 by 3.2 by 0.7 inches and weighs 5.5 ounces. It slips easily into a shirt pocket and is slim enough to fit comfortably in even small hands. About the only criticism that can be leveled at the hardware configuration is that the desktop connection requires a dedicated serial port—a scarce commodity on some systems.

COMPACT COMPANION: *The Pilot feels comfortable in the palm of your hand and fits easily into a shirt pocket. The ingenious cradle (right) makes the Pilot an extension of your desktop PC.*

The Pilot's 3.4-inch monochrome screen is readable in nearly all conditions, except for direct sunlight. Although the display feels small, the Pilot's software makes efficient use of the limited screen real estate with a clean, uncluttered interface and a bold, easily readable typeface.

The Pilot has no modem or PC Card slot. Rather, the key to its communications abilities is the Pilot's cradle. With a footprint slightly smaller than that of a 3.5-inch floppy disk, the cradle holds the Pilot securely in an angled position and has a serial cable to connect it to your desktop PC. To synchronize and back up the data on the hand-held device, simply slip the Pilot into the cradle and press the HotSync button in the lower-right-hand corner.

Synchronization is fast and simple. It took about 15 seconds to transfer a day's worth of appointments and update a handful of contacts, to-do-list items, and memos.

The Pilot comes with a complete set of PC-based organizer applications called the Pilot Desktop, a 32-bit suite that runs fine under Windows 95. If you are still using Windows 3.*x*, you must install the included Win32s files to use the Pilot's software. The software was still in the beta stage during our testing but ran without incident.

The Desktop suite includes an address book, a calculator, a date book, a memo pad, and a to-do list. The find feature, which lets you search for text strings contained in documents created with any Pilot application, is a real time-saver. All the applications have desktop companions that make it easier to input data with a keyboard or print via your dedicated printer. We were pleased with the responsiveness over a variety of chores, from updating a calendar to calculating the tip on a dinner bill.

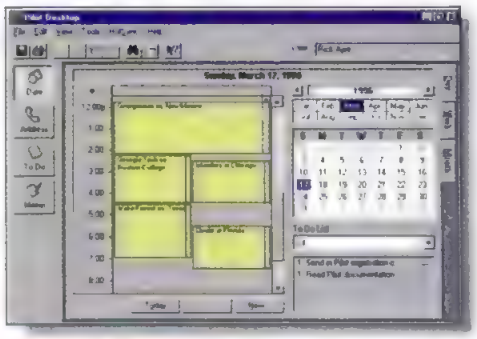
The Pilot's center of attention is its date book. Though it may lack some of the features of a high-end PIM, such as the ability to print in many output formats, it offers all the basics. Without even consulting the documentation, we were quickly able to schedule an appointment, check for conflicting events, write reminders for events such as birthdays, and print a simple schedule.

There are three ways to enter information into the Pilot. The first method is to transfer data from the Desktop applications. A second way is to touch-type on a screen-based keyboard on the Pilot's display. Finally, you can use the Pilot's pen to write on the touch-sensitive section below the screen. This last method takes a bit of getting used to, because you have to use the Pilot's handwriting-recognition software, Graffiti. But once you get the hang of it, it is nearly 100 percent accurate.

The Pilot 5000 we tested had 512K of memory and could hold approximately 5,000 records, 2,500 contacts, 500 to-do-list items, and five years' worth of appointments, according to U.S. Robotics. The Pilot 1000 ($299) has one-quarter as much memory and can handle about one-fifth the amount of data, including a year's worth of appointments.

Still to come are Pilot accessories, such as a modem connection. Also in the works, according to U.S. Robotics, are data translators for the most popular PIMs, such as Day-Timer Organizer, Ecco, Lotus Organizer, OnTime, and SideKick.

There is much to like about the Pilot, as long as you're willing to take the time to learn Graffiti. But we have some concerns about the early models we saw. Though they are small, lightweight, and fast, they don't feel well constructed. Also, the cradle is an efficient way to transfer data, but it doesn't charge the pair of AAA batteries required by the hand-held unit, and there's no backup battery. When your batteries run out, you have only 3 minutes to replace them, or you will lose all data on your Pilot. Of course, you don't lose the data on your desktop PC, so the moral is to be sure that you back up your Desktop files frequently.



PILOT DOES WINDOWS: *The Desktop software tightly integrates the device with Windows 95 and your desktop PC.*

Nevertheless, the Pilot is an innovative entry in the world of hand-held computing, a field that many had come to think of as moribund.

Pilot 5000. Estimated street price: $369. Requires: 8MB RAM, 5MB hard disk space (for Windows 95) or 9MB hard disk space (for Windows 3.1 or later), serial port. U.S. Robotics, Palm Computing Division, Los Altos, CA; 800-881-7256, 415-949-9560; http://www.usr.com/palm. *Circle 440 on reader service card.*

FIRST LOOKS PLUS

From April 29 to May 3, you can go online to discuss the Pilot 5000 with Ed Colligan, vice president of marketing for U.S. Robotics' Palm Computing Division, and Rick Ayre, an executive editor of *PC Magazine*. Just type GO EDITOR on CompuServe to join the discussion.

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CIRCLE 235 ON READER SERVICE CARD

MONITORS

NEC's MultiSync M500 Monitor Is More Than Just Another Pretty Face

By Steve Buehler

NEC's first desktop multimedia monitor—the $599 NEC MultiSync M500—combines innovative screen technology with unique industrial design to produce a one-of-a-kind visual experience. The result is a monitor that produces a great picture and is also a striking piece of visual sculpture for your desktop.

The M500 uses a 15-inch-diagonal cathode-ray tube (CRT) that yields 13.8 inches of display space. From the start, the M500 monitor has been designed to handle high-resolution work demanded in business environments. The M500 uses what NEC calls CromaClear, which consists of a sophisticated vertical slot mask, normally found on television tubes, and a new phosphor layout that results in the close positioning of adjacent electron-gun beams.

This combination of oval phosphor dots and the slot mask results in more radiated energy from the phosphors passing through the mask. And because the phosphor dots are closer together and brighter, the image appears clearer and brighter. This design also minimizes electron-beam energy dissipated onto the slot mask itself, which in theory should contribute to both brighter pixels and a longer life expectancy for the CRT.

THE MONITOR'S VOICE

The M500 adds speakers to an NEC monitor for the first time. Built into the lower corners of the monitor case, these 2-watt speakers had a frequency response of 230 Hz to 18 kHz, ±6 dB. This is a good frequency range for built-in speakers, and the audio quality was acceptable for most business applications, but you won't mistake them for quality external speakers; anything with wide dynamic range or high sound levels sounded thin.

NEC has added sound-mode controls—accessible through the monitor's On Screen Manager (OSM) program—to let the user tailor the audio output. The default Voice/Standard mode passes sound through to the bass and treble controls. The Music/Game and Movie/TV modes modify volume and add minor phase variations between speakers. The Mono to Stereo mode separates certain frequencies across each speaker to give the impression of stereo output. Volume and balance controls are accessed through the OSM; there's also a convenient mute button on the front panel.

Another new feature is Video Boost, which is meant to compensate for the general darkness of video images. This lets the user increase the brightness and the perceived clarity of the monitor's image. Starting at the center of the screen, the user can boost one-quarter, one-half, or all of the screen's real estate. The effect is a much brighter rectangle in the center, which can be especially effective for games, in which much of the action takes place mid-screen, or for a video clip running in a centered window.

DESKTOP SCULPTURE: *The NEC MultiSync M500 presents a radical take on the shape of a monitor and how the screen image is formed (inset).*

Setup and installation of the monitor were a snap. The monitor is Plug and Play– and DDC-2–compliant, and NEC's OSM gives easy access to controls. Basic screen adjustments for setup were simple. OSM doesn't include the screen corner-geometry controls of high-end NEC monitors, but this monitor's images looked great without them.

Using a MicroVision SpotSeeker III and a Minolta CRT Color Analyzer CA-100, ZD Labs ran the M500 through its paces. (For details, see "Bigger Windows," September 12, 1995.) The M500 achieved very good Average MTF (modulation transfer function) scores compared with other 15-inch monitors. We detected no graininess, even on our small-text tests. Spatial Uniformity, which measures the consistency of the luminance across the entire screen, was also very good. The M500 also showed excellent Pincushioning results as well as good Color Tracking and Misconvergence scores.

THE SOUNDS OF RADIATION

The objective measurements were borne out in subjective evaluations. This monitor delivers crisp and clear images, with excellent all-around clarity and brightness. The monitor passed MPR II emissions testing, and testing with the speakers showed only a small increase in radiation emissions.

At $599, this 15-inch monitor is highly competitive. The new CromaClear screen is a distinct technological step forward, and the image clarity shows the positive results.

This is a solid business multimedia monitor wrapped in a case that you either love or hate. For a relatively low price, you can get NEC's reputation, great monitor technology, and a pretty radical design in one package.

NEC MultiSync M500. Estimated street price: $599. Requires: VESA-compatible video output. NEC Technologies Inc., Boxborough, MA; 508-264-8000; http://www.nectech.com. *Circle 406 on reader service card.*

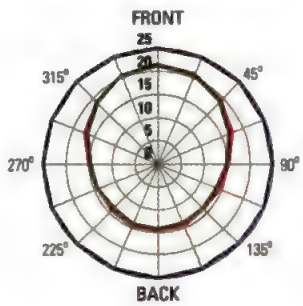
BENCHMARK TESTS

NEC MultiSync M500

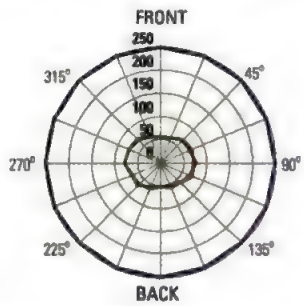
The NEC MultiSync M500 achieved scores that ranged from good to excellent for clarity, sharpness, and brightness. In addition, the monitor passed MPR II emissions testing, although turning on the speakers did increase the monitor's emissions slightly.

ZD Labs used a MicroVision SpotSeeker III to gauge the monitor's performance.

VLF Magnetic Emissions (nT)



ELF Magnetic Emissions (nT)



— MPR II maximum — NEC MultiSync M500: speakers off — NEC MultiSync M500: speakers on

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INTERNET UTILITIES

Puffer 2.0 Buys You Some E-Mail Security via Easy Encryption

By J.W. Olsen

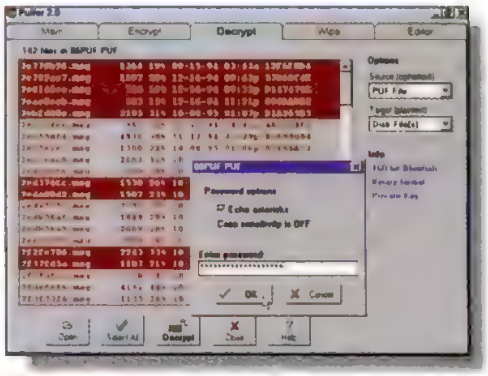
If you exchange sensitive information over the Internet, you probably use multiple tools to encrypt, merge, and compress files, convert the results to seven-bit ASCII, and splice the files to meet Internet e-mail limitations. Kent Briggs' $29 Puffer 2.0 is a deceptively simple program that secures data for e-mail or for safe storage on your hard disk.

For input, Puffer accepts files from disk (up to 1,000 files in one operation), the Windows Clipboard, or a built-in editor roughly akin to the Windows Notepad. You select the type of encryption and choose whether or not to compress the data. Unlike public-key encryption, Puffer requires the same password to encrypt and decrypt a file.

Puffer offers two symmetric encryption algorithms. PC1 is a fast, 40-bit stream cipher based on the RC4 encryption algorithm and provides some of the tightest security allowed for export. Puffer's slower, 160-bit, variable key-size Blowfish alternative is based on a 16-round Feistel scheme and provides an extra level of security, but it can't be exported.

On our informal tests using a variety of files, Puffer's compression algorithm, LZ77, compressed e-mail files nearly as well as PKZIP.

Output targets include Puffer's editor and the Windows Clipboard—which is handy for insertion into e-mail documents or disk files. Output format can be binary (for generating the smallest files), seven-bit ASCII (for e-mail), or self-extracting .EXEs (for recipients who don't have Puffer). A feature splits ASCII output into file sizes that you specify, which is required by some e-mail systems. In case you're compulsive, you can use Puffer to remove all traces of the unencrypted original data from your system.



BE SELECTIVE: *Puffer 2.0's e-mail security system lets you select and restore individual files within its .PUF files to their original state.*

Puffer 2.0 provides a secure, one-stop solution for your encryption needs at a price that's hard to beat.

Puffer 2.0. List price: $29. Requires: 4MB RAM, 1MB hard disk space, Microsoft Windows 3.1 or later. Kent Briggs, Hewitt, TX; http://execpc.com/~kbriggs. *Circle 434 on reader service card.*

WEB-SITE SOFTWARE

DeltaPoint's One-Minute Web Site

By Todd Spangler

DeltaPoint's $99.95 QuickSite 1.0 is a flexible, smart tool that allows just about anyone to whip up a simple and consistent World Wide Web site in record time. Although it is intended for Web novices, the product's text-only HTML editing screen and limited toolbar make it less than user-friendly.

When you start a new Web site in QuickSite, a wizard prompts you to input the fundamental information used for the entire site (such as title and background image). You can set all the pages on your site to have the same design elements: background images, headers and footers, and line rules.

You choose from three site structures, each with various basic configurations of text pages, menus, URL menus, and file-download menus. In the main QuickSite window, all your pages and other elements are listed, along with the type, filename, date and time of creation, and status of each.

You can set the status of a page as *active,* (which generates the page normally), *under construction* (which inserts a yellow construction graphic on the page you've created), *hidden* (which generates an HTML page but doesn't link it automatically to the home page or a menu), or *suspended* (which excludes the page altogether).

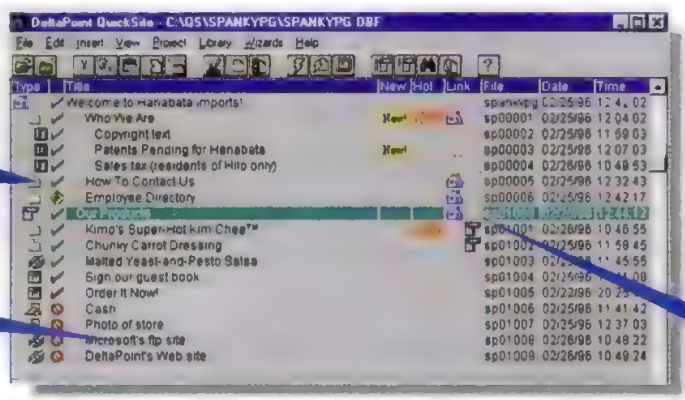
Unlike other Web management tools, such as NaviSoft's NaviPress and Microsoft FrontPage (the latter was reviewed in First Looks, February 20, 1996), QuickSite doesn't let you create and edit pages directly on a Web server. Instead, the pages and text are stored locally in a .DBF database format. When you select Build Site, the program automatically generates all the HTML pages based on your formatting selections.

The program's Publish option exports all required graphics and HTML pages into a single directory and then automatically sends everything via FTP to your Internet service provider. QuickSite includes no HTML viewing capability; you need to launch a Web browser to check the site.

Because a QuickSite site is a self-contained database file, you can easily reuse images, pages, and other elements with a feature called *caret notation.* For instance, if you've already defined *PC Magazine* as a hypertext link to *http://www.pcmag.com*, you only need to include the text "^PC Mag^" in other documents to include the link. If you redefine the original link (say, to *http://www.zdnet.com/pcmag*) and then rebuild the site, all the ^PC Mag^ links will automatically be updated.

In addition to linking to other

Continues on page 48



SITE SURVEY: *QuickSite's main window displays information on all pages and other elements, including title, type, filename, and any links.*

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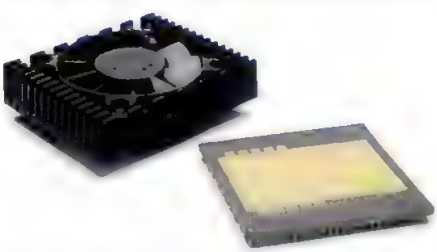

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CIRCLE 080 ON READER SERVICE CARD

QuickSite 1.0

Continued from page 46

elements in your project, QuickSite includes a library of useful graphics, text, forms, and URLs to Web-authoring sites. And if you've created HTML pages using another tool, QuickSite lets you link them. We had problems when we tried to publish a Web site that included external links. QuickSite did not include all the linked .GIF images from the library in the Publish directory; nor did it include the external HTML pages that we linked to the site. As we went to press, DeltaPoint released a fix for these problems.

QuickSite's text-only HTML editing screen is not nearly as easy to use as those of dedicated HTML editing programs, such as SoftQuad's HoTMetaL. As a result, you'll need to be familiar with HTML or learn quickly.

Another drawback is QuickSite's lack of validation tools. There is no HTML validation feature, so if you've made a mistake with your HTML tags, you must locate and correct the error manually. The program also does not verify URLs referenced from the site's pages, as do FrontPage and NaviPress.

Although QuickSite displays your pages in a hierarchical structure, you can't view all the links between pages or those to external URLs. Unlike with NaviPress, you can't use QuickSite to manage an existing Web site unless you're patient enough to import it one page at a time.

It's a fast way to create and maintain a Web site, but QuickSite doesn't offer professional Web developers powerful features. And though QuickSite is generally easy to use, Web beginners will want a better HTML editing tool than the one it provides.

DeltaPoint QuickSite 1.0. List price: $99.95. Requires: 8MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or later. DeltaPoint Inc., Monterey, CA; 800-446-6955, 408-648-4000; http://www.deltapoint.com. *Circle 433 on reader service card.*

HTML EDITORS

Spider 1.1 Makes Web Masters

By Angela Hickman

InContext Corp.'s $99 Spider Version 1.1 is a feature-rich and powerful HTML editor that allows World Wide Web authors to create sophisticated pages without a thorough knowledge of Hypertext Markup Language. Version 1.1 supports the latest HTML standards, as well as Netscape and Microsoft extensions. The trade-off for this power is the program's complexity.

The first thing you'll notice about Spider is that its main window looks like that of a word processor. The main window is divided into a Logical Editor and a Content Editor. The Logical Editor, a vertical pane on the left side of the screen, is a row of buttons that represents the different elements on the active Web page. The Logical Editor is especially useful for navigating complex or lengthy Web pages. You create and edit Web pages in the Content Editor. Entering and formatting text is almost as easy as in a word processor.

Most of the program's functions are accessible from the top menu, which has buttons for creating headings, forms, and lists, inserting images and hyperlinks, and previewing your work. You'll need to rely on the button bubble help (which is new to this version) to figure out what each button does, because the buttons are small and the interface feels somewhat cluttered.

WEB CENTRAL: *Spider's Web Manager makes it easy to add links to other Web sites from your pages.*

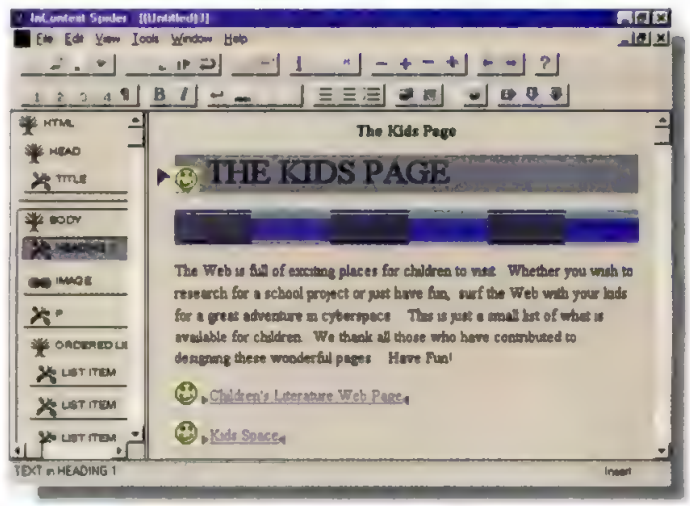
You can create Web pages from scratch, but Spider also provides 28 templates to get you started. In addition to templates for plain HTML 2.0 and 3.0 pages, there are ones for corporate intranet sites, press releases, résumés, and personal pages for children and adults.

Version 1.1 also supports the Windows Clipboard and offers an import feature that will check your HTML for any errors.

Creating a new HTML file is nearly identical to creating a new file in a word processor: Just pull down the File menu and click on the New option. Once you select a template, Spider displays an empty document in which you can add text and drag and drop .GIF and JPEG images, as well as sophisticated HTML 2.0 and 3.0 features such as tables and blinking text.

New to this version is support for both Netscape Navigator and Microsoft Internet Explorer extensions, such as wraparound text and background sound, respectively.

InContext has also improved integration with Navigator. Although Spider comes with the Spyglass Enhanced Mosaic browser, with a few changes to your ICSPIDER.INI file you can also use Navigator to find useful elements on the Web and, after incorporating them with the Spider editor, preview your work. (As of this writing, the beta version of Navigator 2.0 Gold was not fully supported.) InContext plans to release a definition file by the time you read this; it will allow users to edit Java applications within the Spider editor, though users won't be able to preview them.



CHEAT SHEET: *InContext Spider's built-in templates will have you or your company up on the Web in no time.*

One of Spider's most interesting features is its Web Manager. It allows users to insert links from a Web page, download a page from a browser, or jump to a Web page that they want to view.

You can download a trial version of Spider from InContext's Web site at *http://www.incontext.com*. A CD-ROM version, which includes additional utilities, is also available.

InContext Spider Version 1.1. List price: $99. Requires: 4MB RAM (8MB recommended), 12MB hard disk space, Microsoft Windows 3.1 or Windows 95. InContext Corp., Toronto, Ontario, Canada; 800-263-0127, 416-922-0087; http://www.incontext.com. *Circle 435 on reader service card.*

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PC MAGAZINE BEST OF 1995

January 9, 1996
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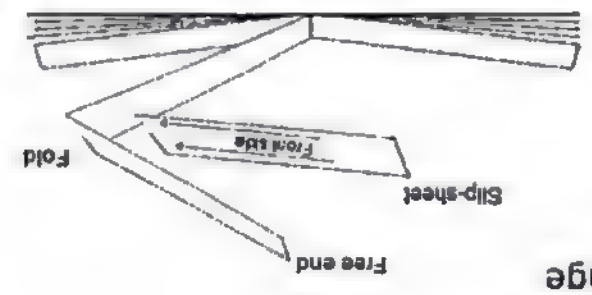

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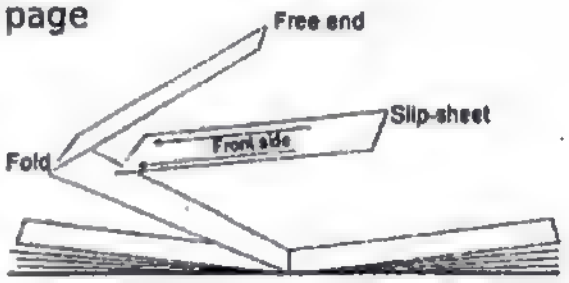

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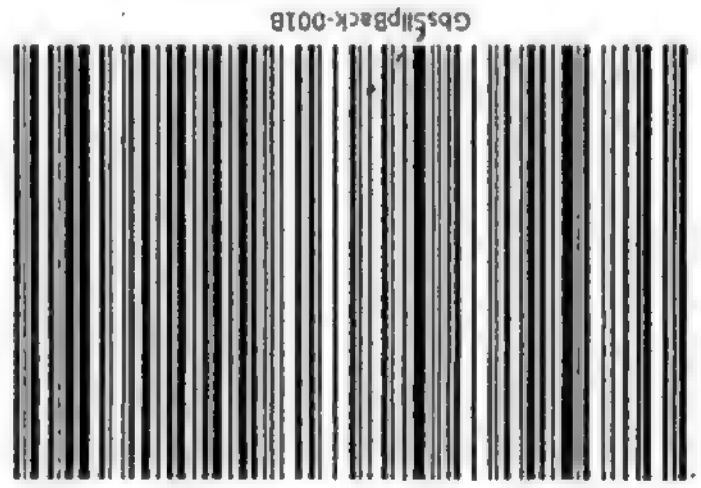

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- APC Per7T surge suppressor.....$39
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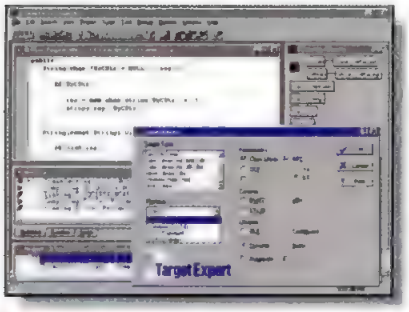
PROGRAMMING

Borland's 32-Bit C++ Suite Boasts Powerful New Tools

By Richard Dragan

Borland's $499 C++ Development Suite 5.0 is a significant upgrade of an already strong C++ compiler, as well as an appealing combination of programming tools. For good measure, Borland throws in advanced C++ language features and Java support (see the sidebar "Borland Jumps on the Java Bandwagon"), making the package a bargain.



PROGRAMMER'S PICK: *TargetExpert builds applications for a range of platforms.*

With Version 5.0, Borland has preserved the basic design of its C++ Integrated Development Environment (IDE) but has added important new features. The new IDE is now a true 32-bit tool that takes full advantage of the Windows 95 interface and long filenames. Small bitmaps, called *glyphs,* are used to provide visual clues to the output messages in the compiler, and the toolbar is now detachable and dockable. Another welcome addition is the ability to build projects in the background while you do other work.

This IDE offers integrated 32-bit multithreaded debugging, complete with disassembly. You can now edit resources such as bitmaps and dialog boxes without leaving the IDE. Significantly, the TargetExpert lets you build programs for a broad range of platforms in use today: DOS, 16- and 32-bit Windows, and Java.

Under the hood, the new Borland IDE uses ObjectScripting to expose all the environment's functionality. It's possible to customize the IDE by writing code yourself using cScript, an object-oriented language based on C++ with hundreds of functions to choose from. You can add your own syntax-highlighting scheme to code or even create custom tools.

The updated C++ compiler offers support for the latest C++ language features, including namespaces and emerging ANSI/ISO C++ keywords such as *Boolean* and *mutable.* Borland's suite includes the ANSI/ISO Standard C++ Library, licensed from Rogue Wave Software, which supports the Standard Template Library and other ANSI/ISO-sanctioned classes such as strings. A separate 32-bit compiler from Intel Corp. provides support for optimizing Pentium and Pentium Pro code.

Other advances include the new ObjectWindows Library (OWL) 5.0, which offers powerful C++ classes for accessing Windows 95 features such as common controls, threads, sockets, and e-mail. Even when working with 16-bit applications, OWL 5.0 emulates the advanced 32-bit Windows 95 common controls and allows the use of .OCX and .VBX controls in both 16-bit and 32-bit Windows programs. In a nod to Microsoft Foundation Classes (MFC), Borland C++ 5.0 supports building MFC projects. The new IDE still requires the use of an AppExpert to automate or browse classes during development. You won't find the ability to browse general C++ classes before you build a project, a feature found in other compilers.

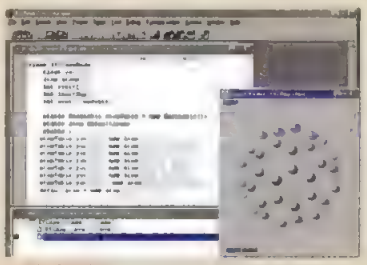
Borland Development Suite 5.0 includes many extras, such as CodeGuard 32/16, which allows you to do bounds-checking and track down memory leaks as you test code. CodeGuard will do a variety of API and resource checks, log errors if it finds them, and point you to the offending lines of code. When you're ready to ship an application, you'll appreciate InstallShield Express, the installer program from InstallShield Corp. that generates install and uninstall programs from wizard-based forms. Finally, the suite ships with a copy of InterSolv's control package, PCVS Version Manager.

Borland has taken advantage of C++ 5.0's CD-ROM packaging by integrating these bundled tools fully into experts, menus, and toolbars. With its combination of licensed developer tools and support for the latest features of C++ and Java, Borland C++ Development Suite 5.0 is a good value and merits serious consideration.

Borland C++ Development Suite 5.0. List price: $499; upgrade, $349.95. Requires: 16MB RAM, 100MB hard disk space, Microsoft Windows 95 or Windows NT 3.51. Borland International Inc., Scotts Valley, CA; 800-645-4559, 408-431-1000; http://www.borland.com. *Circle 402 on reader service card.*

Borland Jumps on the Java Bandwagon

Borland has joined the growing list of vendors offering support for Sun Microsystems' programming language, Java. Borland's C++ Add-On Environment for Java goes a step beyond porting its development environment to Java by adding several powerful features that will better enable developers to begin writing Internet-ready applications.



JAVA-READY: *Borland has fully integrated Java into its C++ environment.*

The Borland AppExpert includes a Java target option. You can select from a variety of settings here using a tabbed dialog interface. This tool generates a default working Java project, including an HTML document, which can then be used to launch your applet.

Full syntax highlighting is included for Java keywords within Borland C++ 5.0. A toggle switch lets you switch between Java and regular C++ syntax highlighting. Borland has provided integrated online help for Java development, although you'll probably still want a book on Java to learn its ins and outs.

The Java Debugger is a full-featured debugging tool that allows you to test your Java applications. You can browse methods in your classes, set breakpoints and watches, and control multiple threads. Instead of running as interpreted code, which is the default for Java, AppAccelerator uses the strategy of "just-in-time" compilation. This means that a Java application can be compiled and saved before it's executed. By avoiding the sluggishness of "interpreted" code, Java applications get a real performance boost.

This bodes well for Borland's plans for Java support. A second Java product (code-named Latté) is in the works and promises to bring a RAD tool approach to writing Internet applications, using Java as its core. But thanks to Borland C++ Development Suite 5.0, you don't have to wait for Latté to get a taste of Java.—*RD*

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GRAPHICS ADAPTERS

Double Vision: Appian's Impulse Graphics Card Gives Your Monitor a View—or Two

By Alfred Poor

AutoCAD and Macintosh users have known for years that two monitors can be better than one, even on a single computer. Appian Graphics now delivers the same powerful display ability for Windows with the $590 graphics adapter, the Impulse A2.

The board comes with two Cirrus 64-bit accelerator chips, 4MB of memory (a 2MB version is available for $490), and a pair of 15-pin Super VGA D-connectors, so you can attach two monitors.

The HydraVision Windows 95 utility (it's also available for Windows NT) lets you configure your display system for multiple monitors to create a single, large desktop-display area. For example, you can specify that images are arranged side by side or one on top of the other. You can also use different types of monitors on the different connections and set different vertical refresh rates at different resolutions for each monitor. You can even install two Impulse cards in one system and use up to four monitors at a time.

First and foremost, the Impulse A2 saves both desktop space and lots of money. Two 15-inch monitors offer about the same viewable area as a single 21-inch monitor, but they take up far less space (especially in terms of depth on a desktop) and cost about half as much.

This configuration also makes it easier to work with multiple applications. For example, you can display one application on one monitor and another on the second monitor, and then drag and drop data between the two without struggling with overlapping or hidden windows. Unfortunately, both displays must run at the same resolution and color depth; it would be nice to be able to set up one monitor for full-color graphics editing and the other for 256-color text work.

The board is fairly easy to install and configure. The only hitch is that in the System Properties window, the Device Manager tab shows a problem with the Cirrus graphics chips. Appian says this is because Windows 95 doesn't fully support this dual-accelerator approach.

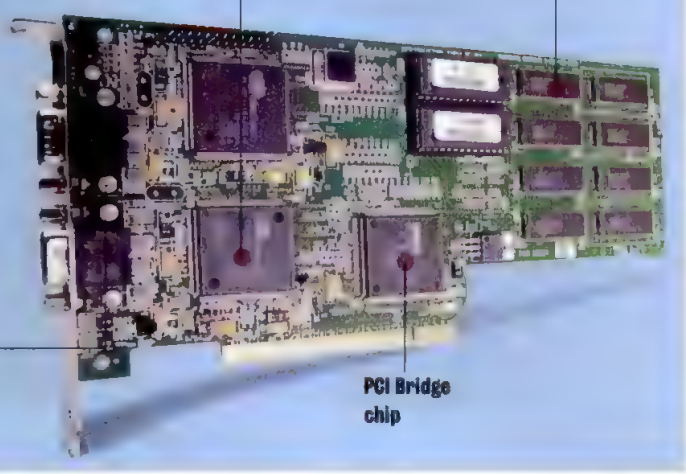
The Impulse A2 performed respectably on our Graphics WinMark 96 tests. At 2,048-by-768 resolution (the equivalent of two 1,024-by-768 displays), it posted a score of 7.1 million pixels per second, compared with 11.1 million pixels per second from a single-chip card using the same accelerator. The primary cause of the performance hit, according to Appian, is that these benchmark tests generate some BitBlt operations that span both monitors. This means that one portion must be buffered by one chip and the data transferred to the other chip, and then that buffer memory must be recovered.

Another potential hitch with the Impulse A2 is that it hews closely to the PCI local-bus specification, particularly to the PCI Bridge feature. As many as 20 percent of existing Pentium PCI motherboards fail to comply strictly with this specification, according to Appian. But the company has created an A2N model that does not require Bridge chip support. And Appian has a short product-development cycle for new drivers and software revisions, so users are likely to become familiar with the company's FTP site as a source of updates and fixes.

The Impulse A2 could prove to be a big hit with Windows 95 users who are looking for alternatives to large-monitor upgrades for their systems. The dual- (or even quad-) display feature can save space and enhance productivity—for a cost that's much less than that of a large-format monitor.

Impulse A2. List price: $590. Requires: *x*86 system supporting PCI bus specification 2.0 and the PCI BIOS Bridge. Appian Graphics, Redmond, WA; 800-727-7426, 408-985-1543; http://www.appiantech.com. *Circle 437 on reader service card.*

TWO-FOR-ONE GRAPHICS



OPENING WINDOWS: *The Impulse A2's HydraVision interface (immediately above) adds its own tabs to Windows 95's dialog box. The Impulse A2 (top) vastly improves screen area by spreading the windows across a pair of monitors.*

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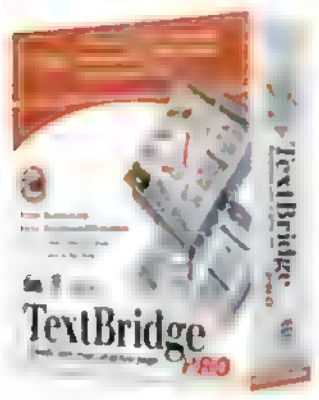

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CIRCLE 163 ON READER SERVICE CARD

AUTOMATION

Oberon's Prospero Binds Applications Together

By Stephen W. Plain

Most popular desktop applications include support for OLE 2.0 and other APIs that provide communication with other programs. Oberon Software's $695 Prospero 1.0 takes interapplication communications and automation a step further by eliminating any programming required to get programs to speak the same language.

The 32-bit Prospero runs under Windows 95, Windows NT 3.51, or Windows 3.11 (using Win32s) and is a visual programming environment that encapsulates application documents, control structures, and other operations as building-block templates that you can connect visually using the program's drag-and-drop interface.

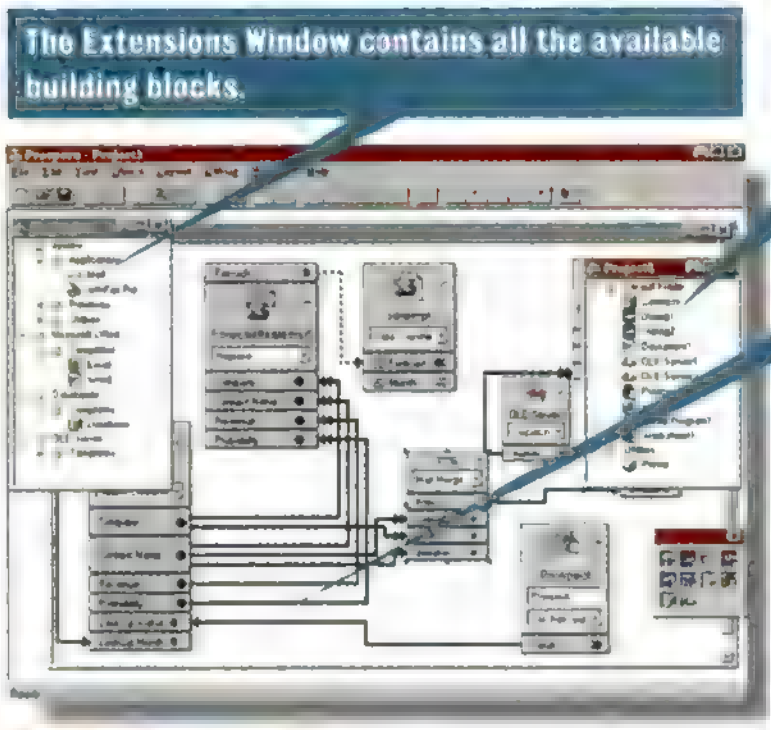
The Extensions Window organizes the building-block templates using an Explorer-like tree structure that is organized by application and function. The Project Window contains a similar tree that holds the building blocks you've dragged into your current project.

Despite this simple paradigm, Prospero's building blocks can be highly specialized; as a result, your project can become rather cluttered. You can organize the blocks into folders in the Project Window. The product is scalable and allows you to treat your visual programs as building blocks themselves.

The Visual Program Editor is where your program takes shape. Instead of writing code, you drag building blocks from the Extensions Window. When you drop a building block into your program, it appears as a rectangular block and prompts you for its basic settings.

Prospero does a great job of predicting your actions, which is the key to a successful visual-design environment. Each building block has a drop-down list of appropriate "behaviors" that determine which action it will perform.

As you select one of the listed behaviors, the appropriate ports—spots on the building block where you can attach connections—automatically appear. As your visual program becomes more complex, you can tidy up the window by combining multiple connections and reducing building blocks to icons.



CLICK AND CONNECT: *Prospero removes the mystery of OLE Automation with an intuitive interface.*

Prospero provides targeted support for a small list of popular applications, such as Lotus Notes, Microsoft Excel, Microsoft Word, and Symantec Act!. There is also an ODBC building block for database support. The program includes extensions for Microsoft Mail and Symantec WinFax Pro.

Once your Prospero project is finished, you can deploy it royalty-free as an .EXE file with a handful of support .DLLs.

Prospero will eventually be a fully functional OLE 2.0 server so you can embed projects within other applications' documents. The version we tested didn't support in-place editing. The company acknowledged the OLE server limitations in the first release but promised an upgrade this spring.

In its debut release, Prospero is an excellent tool for creating automated processes, albeit with a limited set of applications and scant documentation. We built several complex projects that incorporated data from all of the supported applications, and the projects worked flawlessly.

Oberon plans to continue extending the product's application support and has already posted extensions on its World Wide Web site geared toward Web browsers, Adobe Acrobat, Crystal Reports, Unix rcmd automation, and more.

Prospero 1.0. List price: $695. Requires: 8MB RAM, 10MB hard disk space (20MB recommended), Microsoft Windows 3.1 or later, Windows 95, Windows NT 3.51. Oberon Software Inc., Cambridge, MA; 800-654-1215, 617-494-0990; http://www.oberon.com. *Circle 407 on reader service card.*

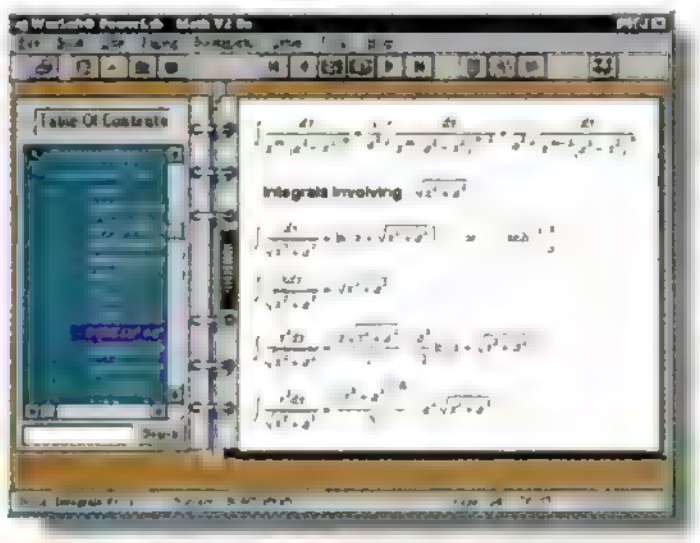
SCIENTIFIC SOFTWARE

PowerLib: Scientific Formulas, Stats, and More

By Barry Simon

Winsoft Corp.'s $39.95 PowerLib-Math, Version 1, is a computerized reference of mathematical formulas, a periodic table of chemical elements that includes basic properties, a units-conversion calculator, and a scientific calculator.

The mathematical formulas are taken from algebra, differential and integral calculus, geometry, probability, and special functions. The probability module includes the basic statistical distributions, including chi-square and student's t distribution.



NEW MATH: *PowerLib-Math provides a good variety of mathematical formulas and an easy-to-read table of contents.*

To the nonspecialist, the amount of detail will seem enormous, but it actually may disappoint professional scientists. There are about 1,000 indefinite integrals, whereas the standard tables of integrals contain many times that number. The special functions that are discussed in PowerLib include Bessel, Beta, and Gamma, but it leaves out Hyper-Geometric, Legendre, and Tchebechev polynomials.

If you click on an element in the periodic table, a panel pops up with the element's attributes, including its atomic weight and melting and boiling points.

The interface is utilitarian: The basics show a directory tree on the left with an outline and the detailed formulas on the right. The topics are also searchable.

PowerLib-Math may cause your printed reference books to collect dust.

PowerLib-Math, Version 1. List price: $39.95. Requires: 4MB RAM, 4MB hard disk space. Winsoft Corp., Santa Ana, CA; 714-833-8838, 800-494-6763; http://www.winsoft.com. *Circle 401 on reader service card.*

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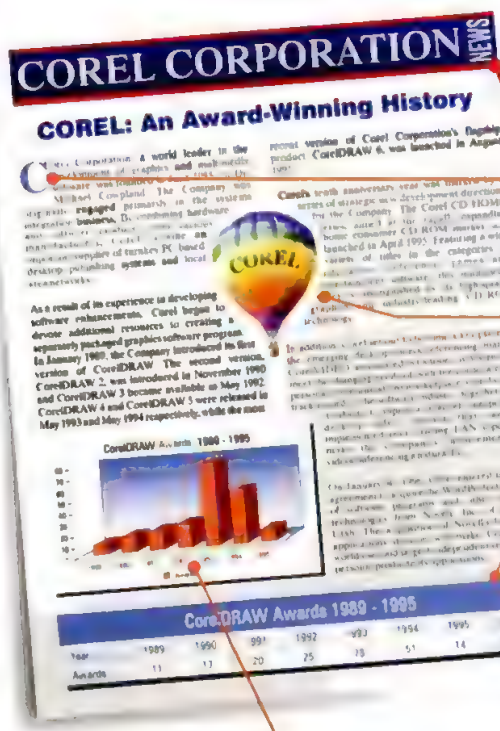

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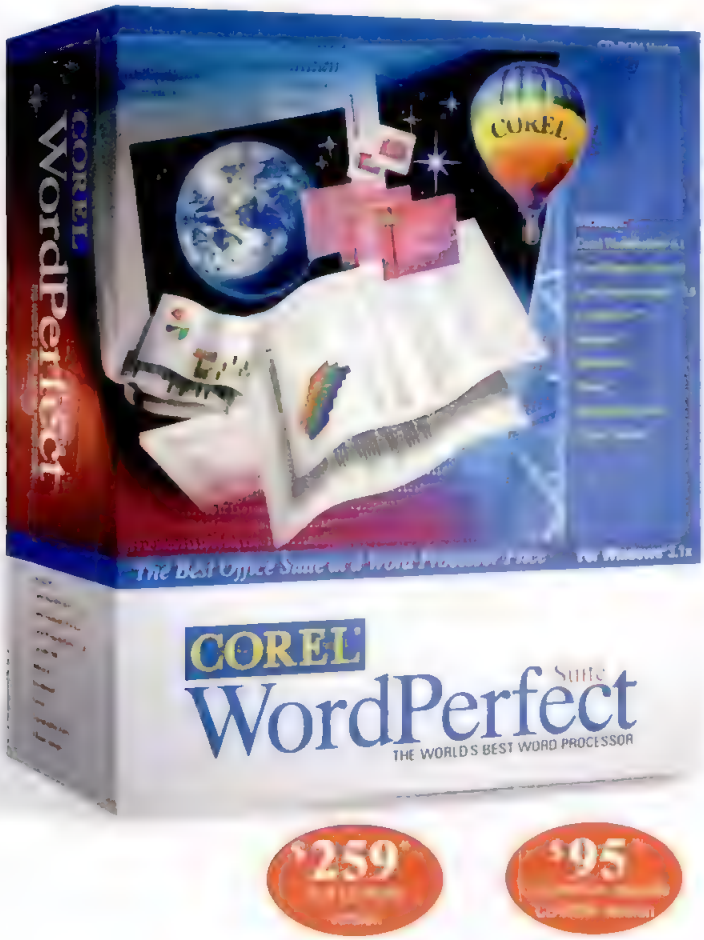

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CIRCLE 332 ON READER SERVICE CARD

IMAGE MANAGEMENT

Imaging for Windows 95: The Future of Graphics

By J.W. Olsen

The first tangible fruit of the April 1994 agreement between Microsoft Corp. and Wang Laboratories is Imaging for Windows 95, Version 1.0. Although the feature set may not rival those of enterprise-imaging solutions such as products from KeyFile or Watermark—or even alternatives targeted at the individual such as Caere's PageKeeper or DocuMagix's PaperMaster—as a free download from Microsoft's or Wang's World Wide Web sites, the price is right.

Imaging for Windows 95 will eventually be fully integrated into and distributed with successors to Windows 95 and Windows NT. For now, it is an image management add-on that integrates into the operating system.

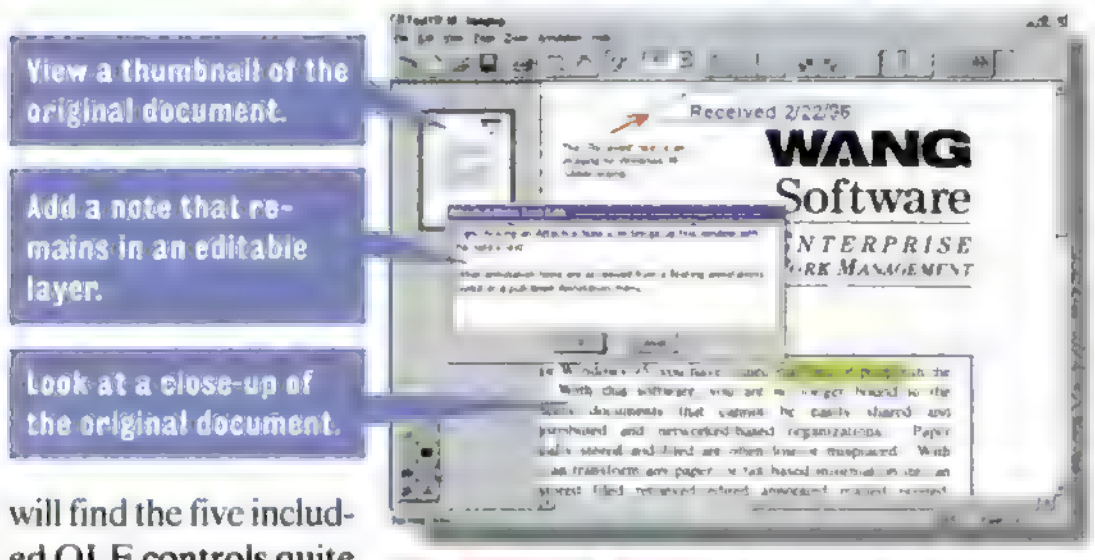
The beauty of the program is that you can bring images into Imaging for Windows 95 via a Twain-compliant scanner or by opening a variety of popular graphics formats. Also, when you view a fax in the Microsoft Exchange Inbox, the fax is loaded into Imaging for Windows 95.

Remarkably for an application designed to be intrinsic to an operating system, you can't drag files from the Windows 95 Explorer into Imaging for Windows 95. This feature will be added later this year. Meanwhile, we found that you can place a Shortcut to the program's executable file (WANGIMG.EXE) on your desktop or in the SendTo folder.

Imaging for Windows 95 provides fairly rich annotation tools for images, including attached notes. But depending on your image's file format, you may first need to save the image in the TIFF 6.0 Multipage format. Otherwise, annotations are permanently burned into a file.

Users and developers alike will appreciate Imaging for Windows 95's OLE 2.0 support. Users can link and embed objects into documents in Lotus Notes, Microsoft Word, and other programs, while corporate developers will welcome the potential that OLE Automation brings.

Developers and integrators will find the five included OLE controls quite useful. The program's ImageEdit interface displays graphics and is indispensable for managing documents, while the Annotation Toolbar allows the user to customize the product's annotation toolbar. The Thumbnail Viewer generates a quick look at any image of interest, and the program's Scanner Control is for setting up and using scanning hardware. The Administration interface lets you set user preferences as well as read and write document information.



THE ANNOTATED EDITION: *Imaging for Windows 95 provides several image-annotation tools.*

During our evaluation, we found that the 32-bit Imaging for Windows 95 was fast and behaved well within Windows 95's multitasking environment. The extensive feature set provided solid, basic image management capabilities. But as the heir apparent to imaging tasks within future Windows operating systems, the application's most significant value is the standard it defines for imaging.

Soon, when you share annotated images with other Windows 95 users, you will no longer need to worry if they will see what you wrote and where you placed it.

Imaging for Windows 95, Version 1.0. List price: Free. Requires: 8MB RAM, 10MB hard disk space, Microsoft Windows 95 or Windows NT. Microsoft Corp., Redmond, WA; 800-426-9400; http://www.microsoft.com/windows. *Circle 404 on reader service card.* Wang Laboratories, 800-229-2973; http://www.wang.com. *Circle 405 on reader service card.*

BACKUP

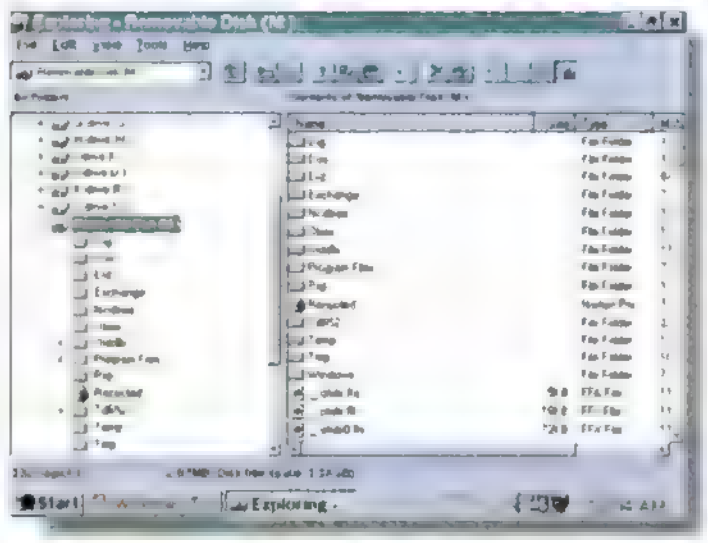
Tapedisk Professional Lets a Tape Drive Mimic a Hard Disk

By Sal Ricciardi

The $249.95 Tapedisk Professional for Windows 95, Version 6.5.2, takes a unique approach to solving the backup problem. It lets most popular QIC, DAT, or DDS tape drives act like a hard disk on your PC. Once a tape is loaded, it becomes another drive letter, and you can manipulate files with DOS commands or your favorite Windows file manager.

The attractions of this approach are simplicity, familiarity, and instant access to your tape's contents. Unfortunately, the product's operation as a real-mode device driver and surrounding utilities make setup detailed and cumbersome.

Tapedisk's installation is time-consuming and awkward: Not only do you have to create AUTOEXEC.BAT and CONFIG.SYS files manually and specify command-line arguments, you have to seek out hardware settings. As a result, it's best suited to power users comfortable with DOS command-line semantics.



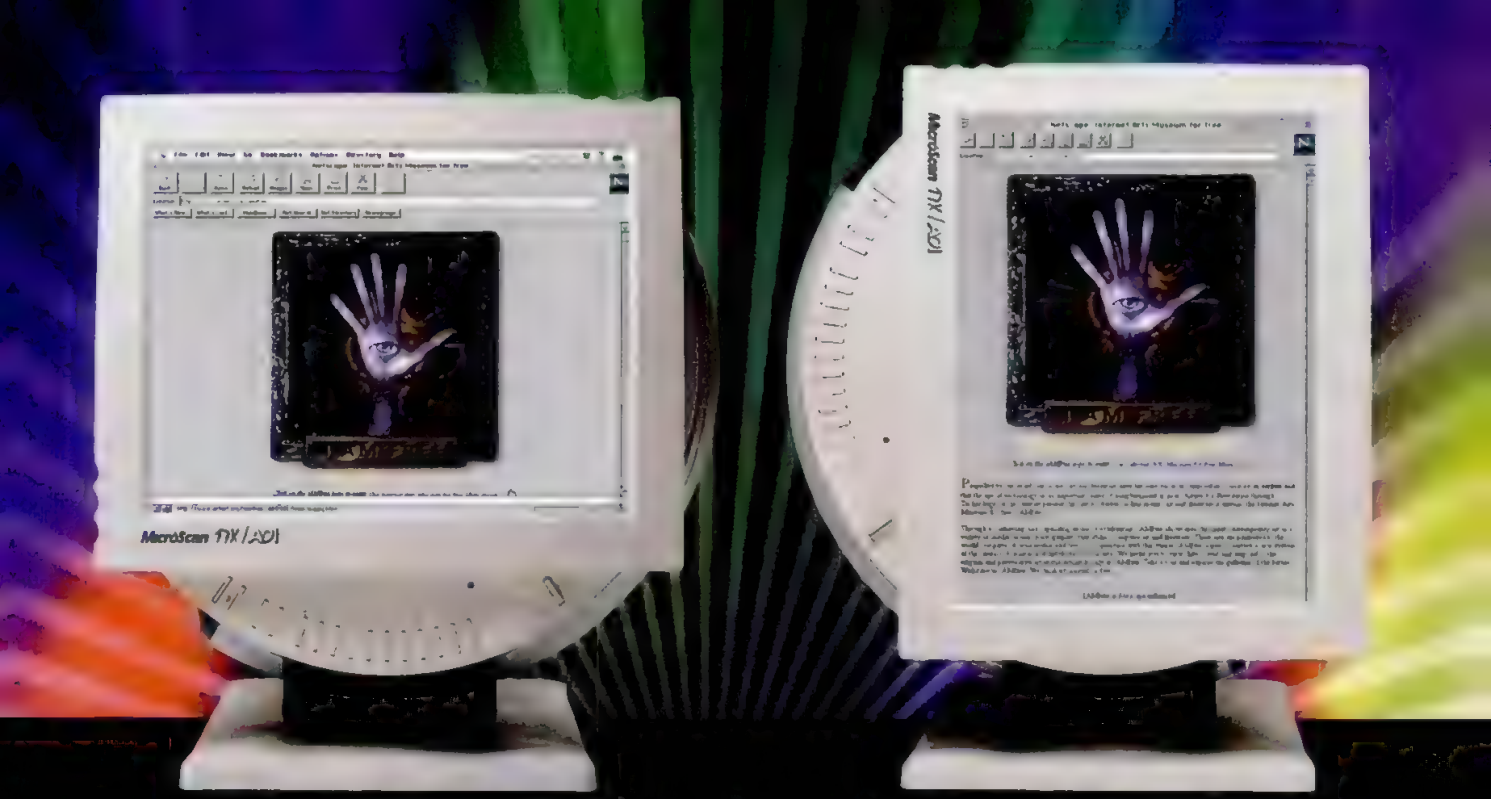
DOWN THE LADDER: *Tapedisk turns your tape drive into a drive letter.*

Tapedisk worked well: We were able to back up and restore files and directories, including those with Windows 95 long filenames. An emergency program called Codeblue involves creating an emergency boot disk to start up your system and load your tape as if it were a hard disk. Once booted, Codeblue can restore your disk and operating system. We tested this feature and found that it can save you a lot of frustration in an emergency, provided you back up diligently and keep your emergency disk updated.

Because Tapedisk flushes its buffers when you unload a tape by using the TDUNLOAD command, forgetting to do so can render a tape unusable. A Windows program prevents this, however.

If you want to add a safety net and make your tape drive behave like a disk, Tapedisk could be your ticket.

Tapedisk Professional for Windows 95, Version 6.5.2. List price: $249.95. Requires: 4MB RAM (for DOS) or 8MB RAM (for Microsoft Windows 95), SCSI tape drive. Tapedisk Corp., Menomonie, WI; 800-827-3372, 715-235-3388; http://www.tapedisk.com. *Circle 408 on reader service card.*



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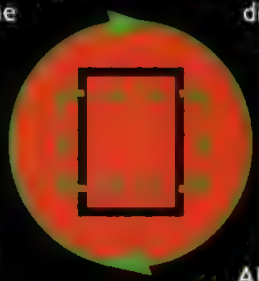

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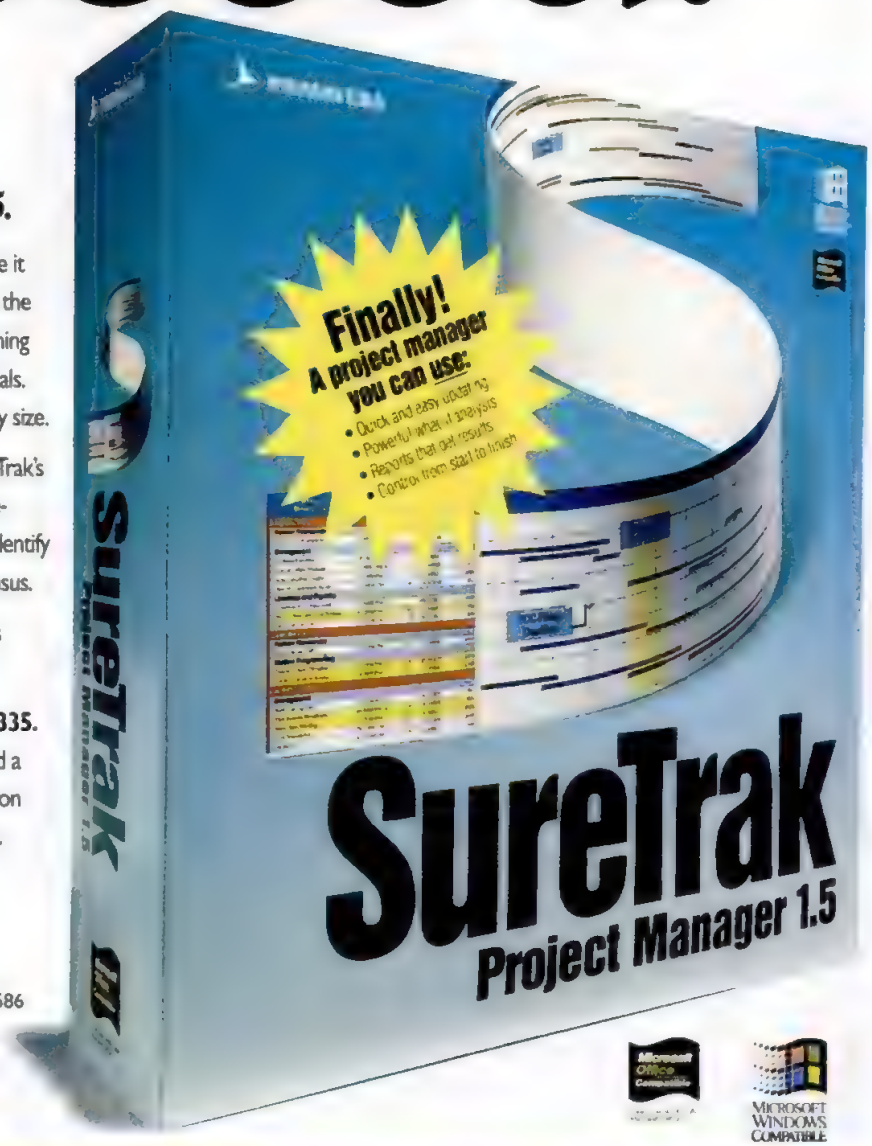

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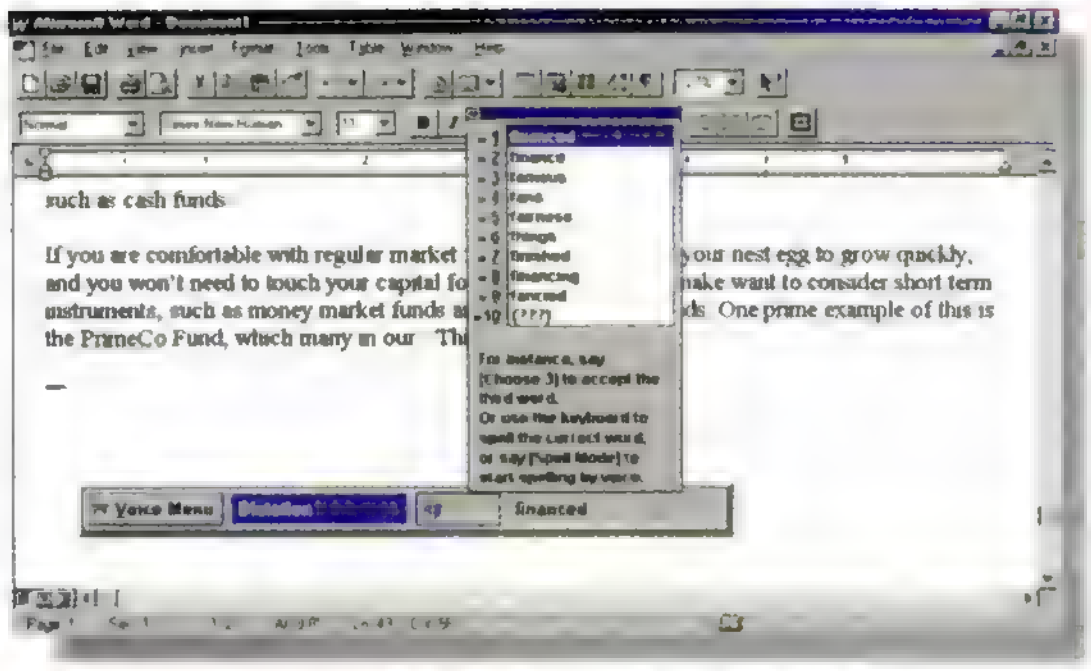

AUDIBLE ERASER: *If DragonDictate guesses wrong, you can quickly correct it from a list of similar-sounding words.*

SPEECH RECOGNITION

DragonDictate Speeds Up Voice Recognition and Navigation

By David Haskin

Dragon Systems' DragonDictate for Windows, Classic Edition, is a significant step forward for voice-recognition software. With its revamped recognition engine, the $695 software package lets you control your Windows environment and dictate into your applications faster than most people can type.

This 16-bit update (a 32-bit version is still being developed) has built-in recognition for over 30,000 words, and you can add more words as necessary. Like its competitors, such as IBM VoiceType Dictation for OS/2 and Windows, DragonDictate uses discrete-speech technology, meaning you must pause briefly between dictated words (First Looks, February 7, 1995). But DragonDictate has made strides toward achieving the goal of continuous-speech dictation: During testing on a 90-MHz Pentium system with 16MB of RAM, DragonDictate managed to reduce the amount of time you must pause between words to a barely noticeable staccato.

To achieve accurate results, you need to train DragonDictate to work with your particular accent and speech inflections. First, there's a brief training session during which you repeat about 750 words and phrases—it took us about half an hour to accomplish this phase. After the initial training stage, DragonDictate was still unreliable. In the first hour of use, the software's statistics window reported only 65 percent accuracy when we were dictating at a mere 12 words per minute.

The second phase of training occurs on the fly when you make the necessary corrections after DragonDictate inserts the wrong word in your documents. As you dictate, DragonDictate displays a window containing as many as ten words similar to the one you just said. If the software inserts the wrong word and the correct one is, say, third on the list, you simply say "choose 3" to insert it. If the word is not on the list, you use the "alpha, bravo. . . " alphabet to spell it correctly.

TALK TUTORIAL: *A training session helps DragonDictate recognize your speech patterns.*

If you made a mistake earlier in your document, saying "oops" displays a window containing a history of your last dozen words inserted. You can correct any of those words directly from the history window. In all cases, DragonDictate learns from the correction and doesn't repeat the mistake. Although this process was quite frustrating at first, after 4 hours we were accurately dictating 50 words a minute with 91 percent accuracy, with bursts as high as 75 words a minute.

We found two flaws with the software. During periods of fast dictation, DragonDictate occasionally misses words because its buffers become filled. Similarly, after a couple of hours of use, the program sometimes stops responding consistently and must be reloaded. A spokesperson said the company was aware of both problems and would issue a maintenance release to fix them by the time you read this.

Though dictation requires discrete speech, DragonDictate now supports continuous, natural-language speech for controlling your Windows environment and applications. We initially found it disorienting to switch between discrete and continuous speech, which you do by issuing either the "dictate mode" or "command mode" instructions.

To control the mouse, you speak simple commands, such as "mouse down" or "mouse left." Despite enhancements, we found this basic control still lacking; it was difficult to stop the cursor exactly where we wanted. To rectify this, Dragon has added an innovative grid system for improved precision. When you speak the "mouse grid" command, a numbered grid covers the screen. You move the mouse pointer to a square by saying the appropriate number. A smaller grid then surrounds the mouse pointer's new position, followed by an even smaller grid, until you've zeroed in on the precise position. We found this a very precise but time-consuming method of navigation.

DragonDictate comes with voice-command support for all the major office suites except for the Paradox database in Corel Corp.'s CorelOffice (formerly PerfectOffice). Other than support for several Windows applets, there is no built-in voice-command support for applications that aren't a part of suites, but you can build your own voice-command sets for any program.

Some users might find DragonDictate's method of correcting mistakes during dictation inconvenient because they must keep their eyes on the monitor. This arrangement will work fine for writers, executives dictating memos, and some users with handicaps, but until the program is well trained, it may be troublesome. By contrast, IBM VoiceType Dictation for OS/2 and Windows doesn't require on-the-fly error correction and offers few tools for doing so.

DragonDictate won't meet the expectations of those who want space-age continuous-speech dictation. Even though the software's all-around voice-dictation speed is faster and vastly improved, DragonDictate still doesn't offer such a sophisticated solution. But its increased speed and improved navigational skills make it a solid choice if you type slowly or express yourself verbally, or if you have a physical handicap.

DragonDictate for Windows, Classic Edition. List price: $695. Requires: 12MB RAM (16MB recommended), 30MB hard disk space, Microsoft Windows 3.1 or later, Sound Blaster or Microsoft Windows Sound System sound card. Dragon Systems Inc., Newton, MA; 800-825-5897, 617-965-5200; fax, 617-527-0372. *Circle 403 on reader service card.*

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CIRCLE 379 ON READER SERVICE CARD

ELECTRONIC PUBLISHING

Publishing Essentials Provides High-Impact, Low-Effort Tools for Digital Documents

By Edward Mendelson

Tumbleweed Software's Publishing Essentials quickly and automatically builds electronic documents based on Tumbleweed's Envoy technology. The $695 package includes a richer set of publishing tools than Adobe provides for its rival Acrobat format and gives Envoy an advantage in the race to become the standard for digital documents.

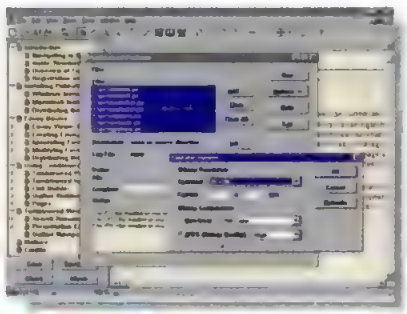
The heart of the package is the familiar Envoy Viewer and printer driver. Developed by Novell's Tumbleweed division, Envoy has been part of the PerfectOffice suite, which was recently bought by Corel Corp.

You create Envoy documents by selecting Envoy as your printer driver in Windows 3.*x* or Windows 95 and then printing a file in almost any application. This file then appears in the Envoy Viewer, where you can add highlighting, Post-It notes, display thumbnails, and hyperlinks.

In Publishing Essentials, the standard Envoy Viewer is supplemented by the Tumbleweed Viewer Extensions, which add a full-text search engine, an outline navigation tool, and an option to display documents full-screen. The Envoy Viewer is available free from Tumbleweed's World Wide Web site, but we recommend you spend the $79 and get the deeper Tumbleweed Extensions package.

Higher-level tools in the package include Tumbleweed Publisher, a program that lets you convert groups of Envoy files to PostScript format, Encapsulated PostScript format (EPS), or the Portable Document Format (.PDF) used by Adobe Acrobat. You also use this program with output files created by applications such as Quark XPress that produce PostScript output and don't give good results with the Envoy Viewer.

Though fast and effective, the process is less automated than in Acrobat's Distiller, which can create .PDF files without a separate batch-conversion. Tumbleweed's proprietary PostScript technology can even handle files that include embedded random fonts like those from FontShop's Beowolf, and it isn't fazed by complex fountain fills or other advanced PostScript effects. The Publisher program can be downloaded from Tumbleweed's Web site for $199.



FRONT AND CENTER: *The Publisher program in the foreground converts PostScript, EPS, and .PDF files for viewing in the Envoy Viewer.*

Publishing Essentials' most impressive tools are those for building links and indexes over multiple Envoy files. The index builder creates full-text indexes and customizes the list of common words to exclude from the index. Once you've created indexes, an extension in the Envoy Viewer lets you search one or more indexes simultaneously and open the resulting files in the viewer with the search terms highlighted. Unlike Acrobat and Common Ground's electronic-document program, which uses the same Verity search engine, Publishing Essentials uses a home-grown search engine that's less complex but easier to manage.

You can also create links within a single document or ones that span multiple documents. You select a document or index and then choose a text string for which the link builder can search. When it finds multiple occurrences of the string, you then decide which one of these occurrences should be the target of the links; all the other occurrences then become sources for links that point to the target.

You can also manually build links within and between files, and between files and Internet URLs. When you click on a URL link, it opens automatically either in Netscape Navigator or in any version of Spyglass Enhanced Mosaic, if either is installed on your system. This feature won't work with other browsers.

A third tool automatically builds an outline from a single file or multiple files. You can set the builder to create headings that match specific font point sizes, indents in the document, or bold or italic headings. Outlines are stored in separate files, and annoyingly, you can't close an outline simply by closing an associated document. You'll need to rely heavily on your mouse skills, because it has no keyboard interface at all.

Like Common Ground, Publishing Essentials uses Bitstream's TrueDoc technology to create compressed scalable versions of a document's original fonts in the electronic document and guarantee font fidelity on-screen and on the printed page.

Compared with Acrobat, Publishing Essentials is faster and smaller but isn't supported by high-end add-ons such as Adobe's Acrobat Capture program, which batch-converts documents to .PDF files using optical character recognition (OCR). For most electronic publishing jobs, Publishing Essentials gets the job done quickly, simply, cheaply, and effectively.

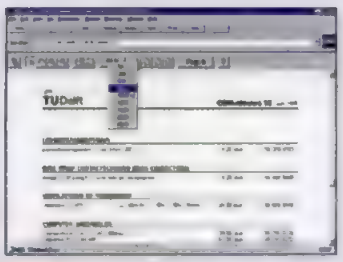
Tumbleweed Publishing Essentials. List price: $695. Requires: 8MB RAM, 7MB hard disk space, Microsoft Windows 3.1 or later, Windows 95. Tumbleweed Software, Redwood City, CA; 800-696-1978, 415-363-7022; http://www.twcorp.com. *Circle 436 on reader service card.*

Envoy's Navigator Extension: The Quick Route to the Web

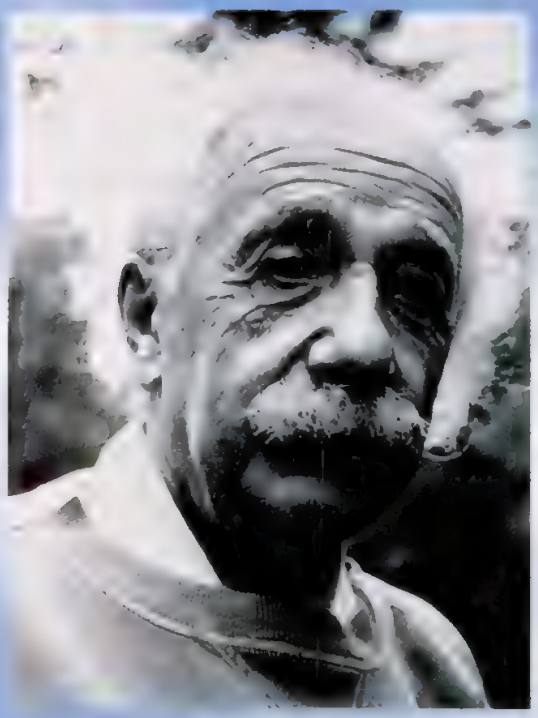
Envoy documents posted on the World Wide Web display quickly in Netscape Navigator when you install Tumbleweed's free Envoy Viewer plug-in, available from the company's Web site.

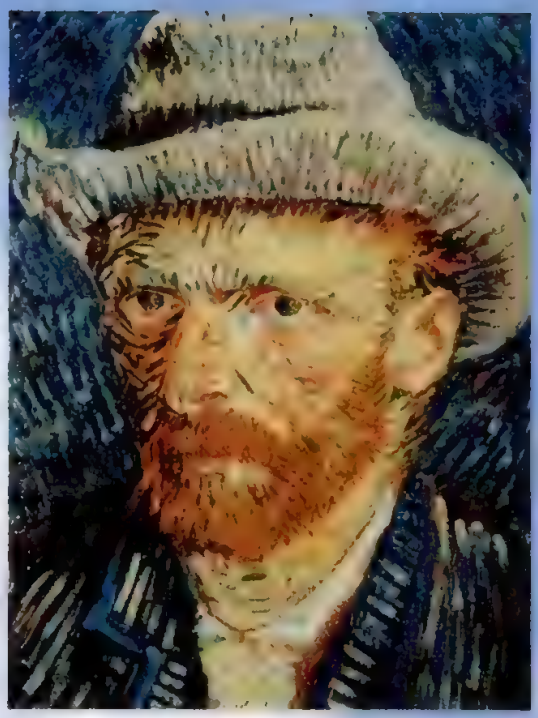
When you click on a link to an Envoy document in Navigator, the document appears in Navigator itself. The document's author can choose to display a navigation toolbar that's clearer and easier to use than the one in the standalone Envoy Viewer.

Complex graphics and fonts display quickly and accurately, and the toolbar lets you jump among pages and zoom in or out. Like the best Navigator plug-ins, it's fast, elegant, and unobtrusive.—*EM*



PLUG IN: *Publishing Essentials' plug-in extension to Netscape Navigator optionally adds its own toolbar when displaying Envoy documents.*





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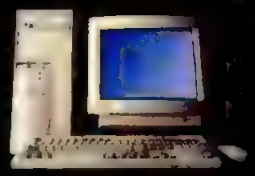

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Second Looks

LIVING WITH THE PRODUCTS WE REVIEW

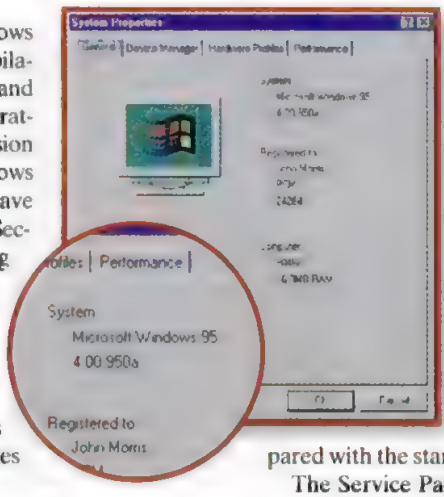
By Brian Nadel

WINDOWS 95

Windows 95 + Service Pack 1 = Windows 96

ASK A DOZEN USERS WHAT THEY DISLIKE most about Windows 95, and you're likely to get 12 different gripes. Although most of Microsoft's new operating system works and works well, there's still room for improvement.

Enter Microsoft's Windows 95 Service Pack 1, a compilation of updates, patches, and fixes that upgrades the operating system to Version 4.00.950a. Many of Windows 95's more onerous bugs have been the subject of earlier Second Looks articles, including the OLE fragment problem (January 9, 1996) and the security hole created by the Password List (March 12, 1996). The Service Pack addresses these glitches and adds fixes for other problems.



The Service Pack will especially help those who use Hewlett-Packard Co.'s emulation drivers for their ink jet printers and receive either a blank page or a page of gibberish with each print job. The Service Pack replaces the LPT.VBX parallel-port driver, an act that eliminates the bug. In addition, the SAGE.DLL from the Plus! pack of Windows 95 add-ons is replaced. This file may have been introducing floating-point calculation errors into your work.

Network administrators will find a browser for NetWare Directory Services with a time-saving Printer Wizard for adding networked printers. The Service Pack also makes Windows 95 clients more compatible with networks based on Samba Unix servers.

Notebook users can take heart too, because the Service Pack includes a driver that supports fast infrared file transfers and printing to an IrDA device. This allows a notebook with the proper hardware to send and receive files at up to 4 megabits per second—almost a 35-fold increase in throughput compared with the standard IrDA transmission speed.

The Service Pack 1 is available on Microsoft's World Wide Web page (*www.microsoft.com*) and on a variety of commercial online services, or by mail on a CD-ROM that includes a full set of Windows 95 drivers for $14.95 (800-360-7561). Next stop: Nashville, the code name for Windows 95's successor, which is due by year's end—and we can start working out the bugs all over again.

BUG BRIEFS

PROBLEM

Since its introduction, Compaq's LTE 5000 notebook line has been plagued with troubles, including problems connecting to some networks, erratic trackball behavior, and incompatibilities with OS/2.

SOLUTION

A series of fixes and updates is contained in SoftPaq sp1459.exe, which can be downloaded from Compaq's Web site (www.compaq.com). OS/2 users will also want sp1480.exe.

PROBLEM

Adobe Photoshop 3.0, the image-editing program of choice for professionals, has never been fully at home in Windows 95.

SOLUTION

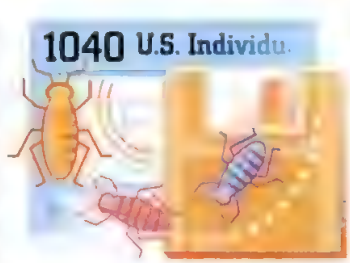
Version 3.0.5 brings Photoshop closer to the Windows 95 world. The CD-ROM update sells for $19.95 (800-521-1976).

FINANCIAL SOFTWARE

Death, Taxes, and Software Bugs

AS IF FILLING OUT TAX forms weren't complex enough, bugs in Intuit's MacInTax and TurboTax programs—as well as its accounting package, QuickBooks 4.0—have once again earned the ire of users at tax time.

Problems in TurboTax include errors in calculating the earned-income tax credit and, in some cases, automobile depreciation. The most embarrassing problem belongs to Intuit's data-transfer feature, TaxLink, which can garble your data when it is transferred from QuickBooks to TurboTax. But by far the most bizarre glitch occurs in TurboTax: The program lets you take a deduction for an individual retirement account (IRA), even if you're over the cutoff age of 70 years and 6 months old.



QuickBooks is not without major problems of its own. The accounting program has trouble handling the federal government's 1099, W-2, and 941 forms.

Intuit's World Wide Web site (*www.intuit.com*) contains all you'll need to fix your present forms if you haven't filed yet as well as information on how to file amended tax returns if you've already filed. Intuit promises to pay any penalties or interest that result from these errors, though that probably won't help you sleep any better.

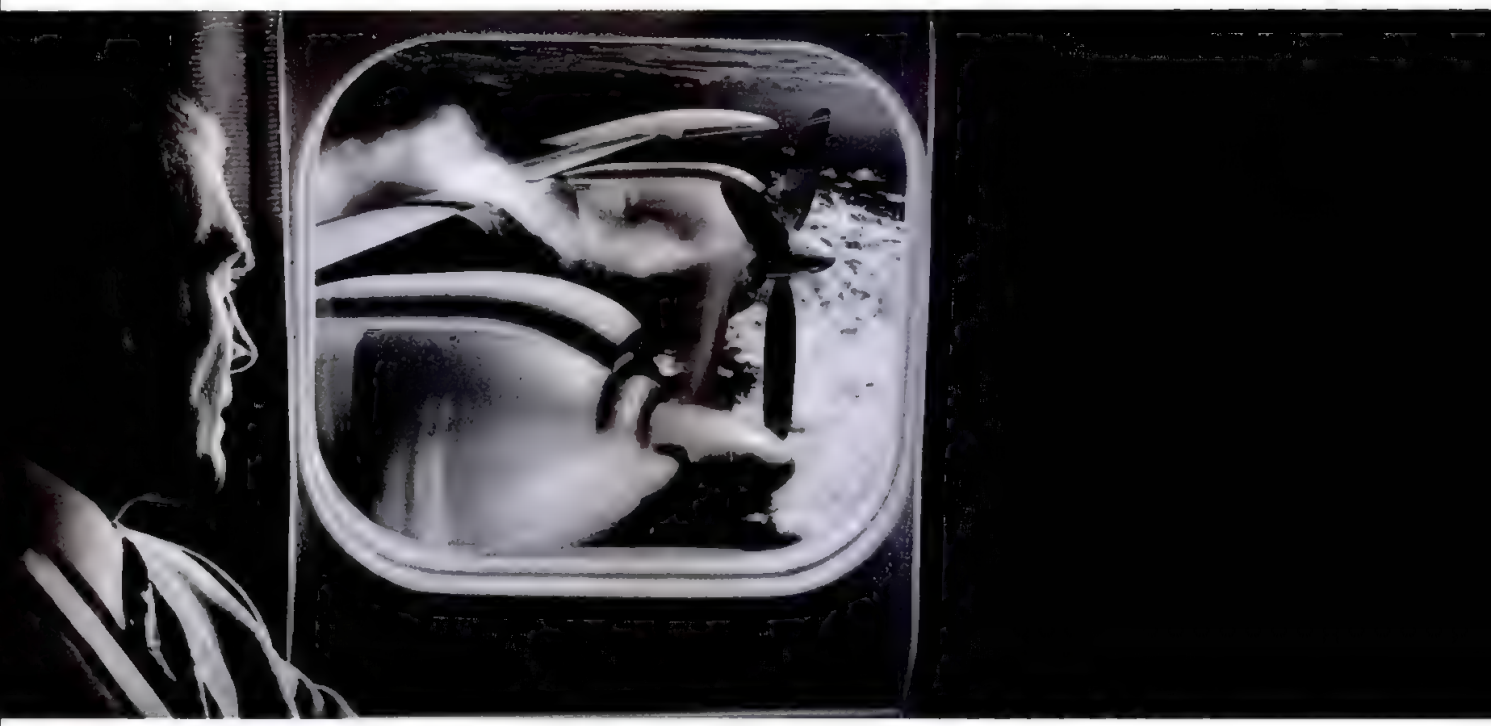
ILLUSTRATION BY JEAN TUTTLE

LOOKING AHEAD

Tell me what you love and hate about these products, and we'll share the information in future issues. • Color ink jet printers • EZ-SCSI 4.0 • Flowcharting programs • HP OmniGo 100 • IBM ThinkPad 760CD • Lotus Notes Release 4 • Multifunction peripherals • PartitionMagic • Pentium Pro PCs • SoftWindows • Windows 95 utilities. Contact Brian Nadel directly via MCI Mail (556-1500) or CompuServe (72241, 1616), or on the Internet at *bnadel@zd.com*.

COMPAQ

Has It Changed Your Life Yet?



The problem with trouble is that usually by the time you find out about it, it's too late. Not so with Compaq Intelligent Manageability. Compaq Intelligent Manageability is a superior collection of preinstalled features and tools found only on the Compaq Deskpro. Together, they work to detect and eliminate a variety of potential problems on your network before they become real ones. Fault Management features like our IntelliSafe drive, which not only notifies you of impending failure but also backs itself up, minimizing loss of mission-critical data

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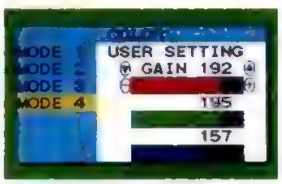

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CIRCLE 329 ON READER SERVICE CARD

New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Melissa J. Perenson

Mass-Storage Blues

FOOTPRINT: *Quantum's Bigfoot.*

HAVE BLOATED APPLICATIONS AND shrinking hard disk space got you down?

Hewlett-Packard Co.'s **HP SureStore** line of hard disks adds new capacity with its $270 two-platter 1.3GB and $380 three-platter 2GB EIDE hard disks. These 3.5-inch drives feature 16.6-MBps transfer rates, seek times of less than 12 milliseconds, and rotational speeds of 4,500 rpm.

Maxtor Corp. is also offering a $419 three-platter 2.0GB drive for a 3.5-inch drive bay. The **7200AP/A** uses an EIDE interface and has an average seek time of less than 12 milliseconds, a rotational speed of 4,480 rpm, and a data-transfer rate of 16.6 MBps.

Quantum Corp.'s unique 5.25-inch hard disk, **Quantum Bigfoot,** lets you install it into your PC without requiring any alterations to your system's chassis. Both the one-platter 1.2GB drive and the two-platter 2.5GB drive have seek times of 15.5 milliseconds, rotational speeds of 3,600 rpm, and data-transfer rates of up to 16.6 MBps, thanks to a Fast ATA-2 interface.

Hewlett-Packard Co., Palo Alto, CA; 800-826-4111; http://www.hp.com. *Circle 412 on reader service card.*

Maxtor Corp., San Jose, CA; 800-262-9867, 408-432-1700; http://www.maxtor.com. *Circle 413 on reader service card.*

Quantum Corp., Milpitas, CA; 800-624-5545, 408-894-4721; http://www.quantum.com. *Circle 414 on reader service card.*

Making the Most of Online Time

TIME YOU SPEND ONLINE IS money out of your pocket.

Dvorak Development Corp., makers of the popular off-line navigator for CompuServe, NavCIS, is now offering three off-line utilities for the Internet and commercial services, all of which may be used with Windows 95 and all of which have trial versions available from Dvorak's World Wide Web site at *http://www.dvorak.com.* This new collection of off-line navigators will help you lessen the time that you spend accessing information online.

OUI: *Dvorak's off-line Usenet interface.*

Dvorak's $69 **NavCIS PRO, Version 1.76,** now integrates CompuServe's Host-Micro Interface protocol. NavCIS PRO now uses the same communications as does CompuServe's WinCIM software. You can use NavCIS PRO to automate the navigation and retrieval of messages from CompuServe's forums. There are such built-in utilities as a spell-checker and a graphics file viewer, as well as the ability to send and receive e-mail using different fonts. If you're a Prodigy user, you'll appreciate the $39.99 **NavStar for Prodigy,** an off-line navigator modeled after NavCIS that will help reduce the time you spend online on Prodigy.

Also building on the off-line navigation technology pioneered by NavCIS is the $39 **OUI Version 1.3,** for use with Usenet newsgroups. Automating your newsgroup message retrieval is as easy as subscribing to your favorite newsgroups, connecting to the Internet to retrieve any e-mail you may have waiting, and retrieving the 100 latest thread subject headers in the newsgroups to which you've subscribed. You can use any Internet dialer, and the software can automatically uuencode or uudecode selected messages.

Dvorak Development Corp., Louisville, CO; 303-661-0345; http://www.dvorak.com. *Circle 430 on reader service card.*

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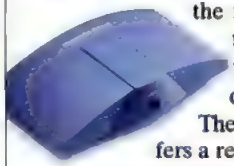


ALTHOUGH UMAX TECHnologies' $399.95 **Maxmedia TV/Pro II** may resemble a device from "Star Trek," it actually represents the future of external VGA-to-TV scan converters. The sleek unit offers a remote control to make it easier than ever to control your presentations and all the last-minute adjustments that are required. The TV/Pro II supports resolutions of up to 800-by-600 for true-color representation on both NTSC and PAL television systems.

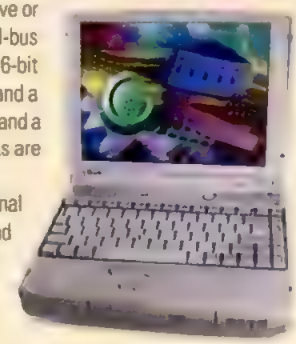
UMAX Technologies Inc., Fremont, CA; 800-562-0311, 510-651-8883; fax, 510-651-8834. *Circle 411 on reader service card.*

PHOTOGRAPHY BY THOM O'CONNOR

HOT PROSPECT

A Multimedia Dream Machine

Who says you need to stay married to your clunky old desktop PC? Toshiba America Information Systems continues to raise the bar for mobile computing with the release of the Tecra 720CDT. Innovation comes at a price, though: The basic configuration of the **Tecra 720CDT** will be priced at $7,500. The system comes with a 133-MHz Pentium processor, 256K of external cache, 16MB of EDO DRAM that's expandable to 144MB, and a 1.13GB modular hard disk that can be swapped with the floppy disk drive or 6X CD-ROM drive. The Tecra features PCI-bus architecture for improved performance, 16-bit full-duplex audio, a lithium ion battery, and a Type III PC Card slot. Telephony features and a V.34 28.8-Kbps modem with RJ-11 jacks are integrated as well.



Particularly appealing for the professional who requires both video playback and recording capabilities, the Tecra 720CDT comes with the Zoomed Video Port technology for MPEG video capture and playback. The active-matrix display has a large 12.1-inch screen running at 1,024-by-768 resolution and supports Chips & Technologies' new HiQVideo Multimedia PCI Video controller and 2MB of EDO VRAM

Toshiba America Information Systems, Irvine, CA; 800-334-3445; http://www.toshiba.com. *Circle 432 on reader service card.*

Print Express

DESIGNING COLOR DOCUMENTS on your PC is one thing; printing them is another. Sir Speedy, the nationwide copying and printing chain, is offering its **Sir Speedy Online** software free via its World Wide Web site. Using the software with Sir Speedy's Digital Network lets you send your artwork, images, and text documents to the participating Sir Speedy location near you, resulting in digital color output directly from your digital originals.

Along the same lines is Deluxe Corp.'s $39.95 **Printovation 1.1**, a software package that gives you online access to professional printing services, including short-run and full-color printing. Simply create a document on your PC using Printovation's templates and Microsoft Word or Microsoft Publisher; use the Printovation software to select your printing, binding, mailing, and delivery choices (including overnight delivery); and then send your documents and order form to the company's printing service, Deluxe Direct, either via free modem transfer or via disk (at no extra charge). **Sir Speedy Inc.**, Mission Viejo, CA; 800-747-7733, 714-348-5000; http://www.sirspeedy.com. *Circle 423 on reader service card.*

Deluxe Corp., St. Paul, MN; 800-386-7127; printovation@dlx.com. *Circle 424 on reader service card*

It's All in the Speed

LEXMARK INTERNATIONAL BRINGS BUSINESS PRINTING home with its laser printer, the **Optra E**. This $550 unit offers 600-dot-per-inch resolution, 1MB of flash memory, PCL 5 and PPDS emulation, and three paper-input sources for handling everything from letter- and legal-size paper to index cards. The printer is rated at 6 pages per minute and includes Lexmark's network printer management software, MarkVision for Windows 3.1.

Lexmark International Inc., Greenwich, CT; 800-891-0331, 606-232-2000; http://www.lexmark.com. *Circle 425 on reader service card.*

Small-Office PCs Come of Age

LOOKING TO BUY A PC FOR YOUR HOME OR SMALL-OFFICE setup? You have a host of options to choose from.

Dell Computer Corp.'s $3,949 **Dell XPS P166 S** comes with a 166-MHz Pentium Pro processor, a Western Digital EIDE 2.5GB hard disk, 16MB of synchronous DRAM (SDRAM), six ISA expansion slots, a 28.8-Kbps modem, a 6X TEAC CD-ROM drive, and a 17-inch monitor. The system's innovations include the use of a 16-bit sound chip set on the motherboard, the new Intel Vx chip set, and SDRAM. You also get Number Nine's Imagine II graphics card, with 4MB of VRAM.

POWERFUL PCs: *HP Vectra 500, Acer Aspire, Dell XPS P166 S (left to right).*

Targeting the small-business market is Hewlett-Packard Co.'s **HP Vectra 500** series. The high-end HP & Microsoft Small Business Center model is priced at $3,340 and includes a 166-MHz processor, 16MB of RAM, a 1.6GB hard disk, a 6X CD-ROM drive, a 28.8-Kbps fax modem with voice mail, the Microsoft Natural Keyboard, Microsoft Office Professional, and a monitor.

Acer America Corp.'s business counterpart to its line of Aspire for the Family PCs is the **Aspire for the Home Office Solution** line. The $2,900 high-end Home Office Aspire system includes a 166-MHz Pentium processor, 16MB of RAM, a 2.5GB hard disk, 1MB of VRAM, three PCI and four ISA slots, an 8X CD-ROM drive, a 16-bit sound card, and a 28.8-Kbps fax modem with a full-duplex speakerphone. The impressive business software bundle includes Lotus SmartSuite 96.

Dell Computer Corp., Austin, TX; 800-613-3355, 512-338-4400; http://www.dell.com. *Circle 427 on reader service card.*

Hewlett-Packard Co., Palo Alto, CA; 800-752-0900; http://www.hp.com. *Circle 428 on reader service card.*

Acer America Corp., San Jose, CA; 800-733-2237, 408-432-6200; http://www.acer.com/aac/. *Circle 429 on reader service card.*

BRIEFS

Books

The authoritative guide to Navigator 2.0 is **The Official Netscape Navigator 2.0 Book**, by Phil James. It's destined to become the Bible to the world's most popular browser, and the bundled CD-ROM includes 16- and 32-bit versions of Navigator ($29.95, Ventana, 919-544-9404) .... **Compute in Comfort, Body Awareness Training**, by karate black belt Paul Linden, is a daily exercise regimen designed to counter the physical stress of computing with desktop PCs, standing workstations, and laptops ($18.95, Prentice Hall, 800-947-7700) .... The latest World Wide Web sites can contain thousands of pages, and you'll need to know more than just a few HTML tags to create an effective design. **Designing Large-Scale Web Sites**, by Darrell Sano, a user-interface designer at Netscape Communications Corp., is a methodological guide to major Web projects ($34.95, Wiley & Sons, 800-225-5945).

Internet

Caravelle Networks Corp.'s **WebWatcher** lets you keep an eye on your Web site at all times. The $294 program offers real-time monitoring of your Web sites and Internet services and alerts you in the event of a problem with your servers (800-363-5292) .... Superscape has made available its free **Superscape Visualizer** for viewing VRML 3-D worlds on your PC under either DOS or Windows (*http://www.superscape.com*).

Hardware

Turtle Beach Systems' **TBS-6700** 6X CD-ROM upgrade kit now has the added advantage of sound. The $330 kit includes the **Turtle Beach**

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MAXIMUM SPECS

16MB EDO RAM Standard – up to 40MB total
Super-fast EDO RAM on board and a second bank for expansion. User upgradable—upgrade without wasting RAM

100MHz to 133MHz Intel Pentium Chip
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Adds the convenience of IRDA-compliant wireless connection

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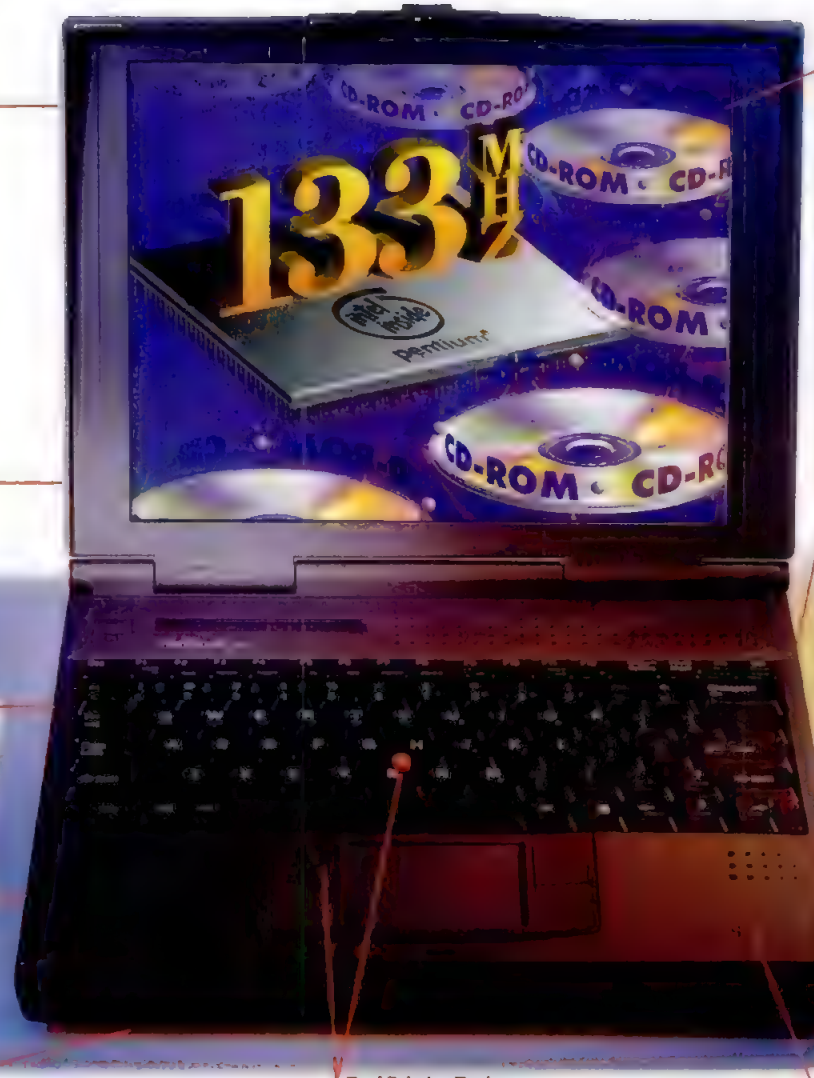
4 more cells than most notebooks plus 52 watts mean longer on-the-road computing with enough battery life to run your CD-ROM



11.3" SUPER VGA Active Matrix Display
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- 16-BIT SOUNDBLASTER COMPATIBLE STEREO SOUND
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- 256K SYNCBURST CACHE
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- 810MB REMOVABLE HDD
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CIRCLE 085 ON READER SERVICE CARD

Designed for Microsoft Windows 95

intel inside pentium

Leading Pentium processor/PCI performance at an affordable price.

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- Free three-year limited warranty for parts and labor[1]

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HP Vectra XM

The ultimate PC for advanced business and technical applications.

- Intel 120 or 133 MHz Pentium processors
- Supports dual processing with secondary processor socket
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- Integrated PCI Matrox Millenium graphics card with up to 1600 x 1200 resolution
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- Free three-year limited warranty for parts and labor[1]

from $3,389*

HP Vectra XU

[1] In Canada call 1-800-387-3867. *Average U.S. street price. Monitor not included. **Other capacities available. HP Vectra PCs come with MS-DOS® 6.2 and MS Windows for Workgroups 3.11 or Windows 95 or OS/2 or Windows NT® included. First year on-site, 24-hour, next-day service. Second and third year, return to dealer. MS-DOS is a U.S. registered trademark and Windows and Windows NT are U.S. trademarks of Microsoft Corporation. Pentium and the Intel Inside logo are U.S. registered trademarks of Intel Corporation. OS/2 is a registered trademark of the International Business Machines Corporation. ©1995 Hewlett-Packard Company PPG425

The fastest PC available.

- Intel Pentium Pro 150 MHz processor with 256KB integrated cache
- Supports dual processing with secondary Pentium Pro processor socket
- 128-bit high performance memory architecture
- 16MB of ECC DIMM memory standard, expandable to 256MB with 8 DIMM memory expansion sockets
- PCI integrated Ultra SCSI Fast 20 interface with 20MB/s throughput
- 1,000MB** SCSI-2 high-performance hard drive
- PCI Matrox Millenium graphics card with 3D acceleration and 2 MB of WRAM, upgradable to 4MB or 8MB
- 7 mass storage shelves (5 front accessible)
- 6 expansion slots: 3 PCI, 1 PCI/ISA combo and 2 ISA
- 10 BaseT/100VG AnyLAN selectable PCI NIC with up to 100 Mb/s throughput
- Integrated 16-bit audio and 4X CD-ROM
- Microsoft Windows NT 3.51
- Free three-year limited warranty for parts and labor[1]

from $5,159*

HP Vectra XU 6/150

Exceptional performance and expandability at an affordable price.

- Intel Pentium Pro 150 MHz processor with 256KB integrated cache
- 128-bit high performance memory architecture
- 16MB of DIMM memory standard, expandable to 256MB with 8 DIMM memory expansion sockets
- 1,000MB** Enhanced IDE hard drive
- PCI Matrox Millenium graphics card with 3D acceleration and 2MB of WRAM, upgradable to 4MB or 8MB
- 7 mass storage shelves (5 front accessible)
- 6 expansion slots: 3 PCI, 1 PCI/ISA combo and 2 ISA
- Integrated 16-bit audio and 4X CD-ROM
- Microsoft Windows NT 3.51 or IBM OS/2 Warp
- Free three-year limited warranty for parts and labor[1]

from $4,519*

HP Vectra VT

Since Compaq and IBM don't get the concept of 'value pricing,'

HP PCs would like to shed some light on the subject.

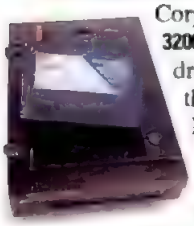
What it *doesn't* mean: bare-bones PCs with pared-down prices. What it *does* mean: PCs with all the features you need for much less than you'd expect to pay. Five prime examples are highlighted here. Compare their features and prices with the other leading brands, and you'll see why HP is the only one inviting comparison. Our entire line represents the best values in the business PC market. From value-priced Pentium® processor-based PCs to our blistering-hot, dual-Pentium Pro processor-based HP Vectra XU PC.

Call 1-800-322-HPPC, Ext. 1106,[1] for more information or the name of your nearest HP reseller. Or visit us at http://www.hp.com/go/vectra. For once, more *is* less.

HEWLETT® PACKARD

The 3.2GB Backup Drive

SO YOU'VE GOT A JUMBO-size, 1GB-plus hard disk and want to back up your data? Performing backups can become a challenge with larger hard disks, but Iomega Corp.'s $300 **Ditto 3200** tape-backup drive takes care of that problem. The Ditto 3200 will provide read/write compatibility with a variety of tape formats, including QIC-Wide, Travan, and QIC. When using the maximum-capacity disk, you can now back up your 1.6GB hard disk without using compression. The parallel-port drive includes a one-click backup utility; an internal version is also available.



Iomega Corp., Roy, UT; 800-697-8833, 801-778-1000; http://www.iomega.com. *Circle 418 on reader service card.*

Images to Remember

LOOKING TO ADD THAT CERTAIN SOMETHING TO YOUR newsletters, documents, or World Wide Web pages?

Image Club's $99 **Sketches Around the World Volume 39** offers a collection of over 200 EPS images and travel sketches, ranging from the Eiffel Tower to the skyline of Manhattan.

For a different approach to texture and background images, turn to Image Farm's series of five PhotoCD CD-ROM titles. Each priced at $135, the disks—**Arizona Desert, Berlin Walls, Cottage & Country, Real Rock,** and **Streets of London**—feature 100 textures and backgrounds taken from close-ups of real-life regions or elements from around the world.

If you're looking for just the right piece of clip art, Nova Development Corp.'s $49.95 **Art Explosion 40,000** should have a sufficient selection. Art Explosion provides you with over 40,000 images in 300 categories across four CD-ROMs. The library also includes 1,200 fonts.

Image Club Graphics Inc., Calgary, Alberta, Canada; 800-661-9410, 403-262-8008; fax, 403-261-7013. *Circle 419 on reader service card.*

Image Farm Inc., Toronto, Ontario, Canada; 416-504-4161; fax, 416-504-4163; image-info@imagefarm.com. *Circle 420 on reader service card.*

Nova Development Corp., Calabasas, CA; 800-395-6682, 818-591-9600; fax, 818-591-8885. *Circle 421 on reader service card.*

Zip It Up

TIRED OF UNGAINLY FILES that won't fit on a floppy disk?

PKWare, the originator of the industry-standard data-compression format, .ZIP, has released the $49 **PKZIP for Windows, Version 2.0.** Based on the PKZIP 2.04g compression scheme, it has a drag-and-drop interface that lets you open multiple .ZIP archives, use password protection on .ZIP files, and accommodate Windows 95's long filenames.

WIZARDRY: *WinZip 6.1's Wizard.*

Vertisoft's $39.95 **Zip-IT** also has a drag-and-drop interface that makes zipping files a breeze, and it adds itself as a menu item in Windows 95's Explorer and Windows 3.1's File Manager for improved ease of use. A search feature allows you to search zipped archives.

Nico Mak Computing's $29 **WinZip 6.1** improves WinZip's interface by offering both the familiar WinZip Classic interface and the new WinZip Wizard, which walks novices through the process of zipping and unzipping files. The box includes both 16-bit and 32-bit versions of the program.

PKWare Inc., Brown Deer, WI; 414-354-8699; info@pkware.com; http://www.pkware.com. *Circle 415 on reader service card.*

Vertisoft Systems Inc., San Francisco, CA; 800-466-5875, 415-956-5999; http://www.vertisoftsys.com. *Circle 416 on reader service card.*

Nico Mak Computing Inc., Bristol, CT; 800-242-4775, 713-524-6394; http://www.winzip.com. *Circle 417 on reader service card.*

Composer Automat

YOU KNOW HOW TO PLAY AN INSTRUMENT, BUT YOU never learned the difference between a staff and a note. **Autoscore for Windows,** from Wildcat Canyon Software, is a $150 music-editing package that helps you bridge this knowledge gap. Autoscore listens to you play an instrument or sing a tune and then translates those notes into a musical score that you can play back and edit, without requiring the use of a MIDI keyboard.

Wildcat Canyon Software, Berkeley, CA; 800-336-0985, 510-527-5155; http://www.wildcat.com. *Circle 422 on reader service card.*

BRIEFS

Tropez 32 32-bit wavetable sound card and 14-watt stereo speakers (510-624-6200) .... The **$3,999 Canon Innova Pro 5400ST** PC comes with a 166-MHz Pentium processor, 32MB of RAM, a 1.6GB hard disk, 2MB of VRAM, and a 6X CD-ROM drive. Targeted at the corporate market, the systems come preloaded with Microsoft Windows NT Workstation 3.51 and come standard with a PCI-based Ethernet-ready network interface card (800-848-4123) .... Need more speed? You can make faster connections with Lava Computer's **$59.95 Lava Link Communications Accelerator.** This interface card is designed to increase the throughput of any V.34 analog modem. It also will allow ISDN users to achieve real 128-Kbps Multilink PPP throughput from an external terminal adapter (416-674-5942).

Software

Are you scheduling an event in the near future? If you use Visio Corp.'s Visio 4.0, you can simplify your task by using TimeSaver Software's **$79.95 Event Sketch,** which features 74 shapes to help you map out your event (714-651-4662) .... Call it the ultimate timepiece for your desktop. Express Technologies Corp.'s **$42.95 World Watch Version 4.0 for Windows 95 and Windows NT** provides you with customizable real-time world clocks (414-337-1640) .... **WGS Linux Pro 3.0,** from Workgroup Solutions, is the $99 upgrade to the commercial version of Linux that offers greater stability and bug fixes over past versions, as well as three supplementary CDs, wider support for hardware and peripherals, a faster TCP/IP stack, simpler installation, and more (303-699-7470).

Designed for Microsoft Windows 95

intel inside pentium

Desktop performance to go.

- Intel 75, 90 or 120 MHz Pentium processor
- 256KB synchronous L2 cache
- 32-bit PCI bus architecture for accelerated graphics performance
- Large 10.4" color display
- 8 or 16MB RAM standard, expandable to 64MB
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- Type III PCMCIA card slot (or use as two Type II slots)
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If you're sold on HP PCs for the desktop, you'll really get carried away with this.

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So you can take off with up to 120 MHz of Pentium®-processor power, turbo-charged by our full 32-bit PCI architecture. When you return to the office, simply slide your OmniBook 5000 into the Docking Station and keep working.

The uncompromising desktop performance you expect from HP, including SVGA active matrix displays, up to 1.2GB hard drives, SCSI II port for CD-ROM support and stereo Sound Blaster compatible sound, have made our OmniBook a real winner. In fact, Hewlett-Packard just received the 1995 J.D. Power and Associates Award for Highest Customer Satisfaction among Notebook Computer Business Users.[1]

Call 1-800-443-1254, Ext. 367,[2] for more information. You'll find that good news travels fast.

HP OmniBook 5000 Docking Station
For easy connections back at the office
from $650*

HP OmniBook 5000VL
Desktop performance in a value package
from $2,925*

HP OmniBook 5000

*Average U.S. street price. J.D. Power and Associates 1995 Notebook Computer Customer Satisfaction Study of Small Businesses. Study conducted [illegible] 1,250 business users in small to [illegible] companies.

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The opening you've been waiting for.

Presenting the world's first integrated in-line, direct-connect PC Card phone jack.

The SimpleJack™ Advantage

Simple to use. Flip open SimpleJack™ and plug in a standard telephone line. That's all. No more interface cables to fuss with or lose.

Horizontal connection. With SimpleJack™, phone cords are kept safely flat on the table, away from your hands and other hardware attachments.

Versatile. SimpleJack™ can be shifted to the PC Card's external port to make room for a second PC Card. Then it can be inserted back into the card for travel.

It may look small.

But the fact is, our new SimpleJack is the biggest thing to hit portable communications since, well, the Pony Express.

Because now connecting your portable to a phone line is as fast and easy as popping open SimpleJack and plugging in a standard RJ-11 phone cord.

SimpleJack accepts phone cords directly, without awkward proprietary interface cables. And SimpleJack's unique horizontal position keeps phone cords safely flat on the table.

You can open and close SimpleJack inside your portable's stacked Type II PCMCIA slot. Or, SimpleJack can be shifted to the card's external port to make room for a second PC Card.

SimpleJack is just one of the many advanced features you'll find in our 28.8 Communicator. Powerful MNP10-EC and TX-CEL cellular error control and avoidance technology makes calling over a cellphone more reliable.

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To find out more about SimpleJack, call us today at 1-800-4-SIMPLE (1-800-474-6753).

Because in today's world, you need more than just the right technology.

You need the right connections.

28.8 Communicator with SimpleJack™

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- 14,400 bps fax
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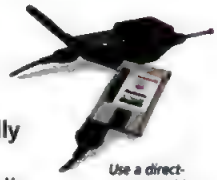
- MNP10-EC cellular error correction
- TX-CEL cellular error avoidance
- Digital line guard
- Complete voice mail capabilities on systems with integrated sound
- Ultrasonically welded steel case
- Windows® 3.1 and 95 compatible communications software
- Five year warranty



Use a direct-connect cable to plug a cell phone directly into the 28.8 Communicator with SimpleJack.

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I received such a letter today. The reader was not upset with anything he'd read but with something I'd said in an interview on a CNBC news show. Such is the danger of airing one's opinions in public. Among other topics, the anchor had asked me about the telecommunications bill, which was due imminently for a vote. I commented on the aspects that affect the computer industry. The anchor asked me about the Exon decency amendment. I told him I was opposed to it, and that I wasn't worried because the ACLU and other groups had vowed to sue for an injunction against the measure the moment the bill was passed. The anchor then said, "But you have children. Aren't you concerned?" I answered that there are effective means to control children's access to places that they shouldn't go. Then we were out of time. Such is the nature of television.

FREE SPEECH

It's up to us as parents and individuals to set our own definitions of decency.

Of course, the telecommunications bill passed, and they slapped an injunction on the Exon provision, now known as the Communications Decency Act, within 24 hours. Perhaps now would be a good time for me to finish my thought.

I remain opposed to the Communications Decency Act. Not because I'm pro-pornography. Not because I'm a free-speech-at-any-cost liberal. In fact, I find many of the "liberties" won by the ACLU to be questionable at best. I'm opposed to the amendment because it establishes a different set of rules for online content than for print or broadcast content.

We already have laws against defamation, false claims, libel, pornography, and slander. These laws apply just as much to material published on the Internet as to material published in any other medium. We do not, however, have laws against bad taste. We have the MPAA ratings for movies, and we have "viewer discretion advised" voice-overs for TV. We have ratings on computer games for violence and thematic content. All of this helps consumers make better-informed choices. I fully expect that we will have ratings on Web sites before the year is out.

Yes, I have children. Yes, I care very much what they watch on television and what they do when they're online. Sure, my 14-year-old daughter is tempted to watch those leering, innuendo-laden shows that seem to be Fox TV's specialty. But she isn't allowed to. Teens are hungry for vicarious experience in life, but the lessons taught by prime-time TV sitcoms and melodramas aren't the lessons I want her to learn. So the TV mostly stays off. She surfs the Net, has e-mail pen pals, and loves chat sessions with other teens. The modem-equipped computer is in the den, where my wife and I can glance over her shoulder. She doesn't like it, but she doesn't have a choice. We used to watch "My So-Called Life" together, too, because a show so laden with teen angst and issues deserved to be shared, discussed, and put in perspective.

I believe that the critical focus we've placed on the quality of media has made a difference. I'm proud of the choices she makes in reading material and media. She laughs at her own unabashed enjoyment of V.C. Andrews–style heart-pounding novels, but she reads the "good" stuff, too. She recently turned off a movie that was thematically too strong for her taste.

My 10-year-old son, meanwhile, determined the reason some messages in newsgroups that he's interested in contain strong language: "It's just kids who want to sound like they're older." Was he influenced to use these vulgarities himself? No, because they're not part of the language patterns around him, and he expresses himself eloquently enough without them.

If this sounds intrusive or overcontrolling, so be it. It's better than the laissez-faire parenting that seems to be the mode of so many of my peers. It's infinitely better than having Senator Exon decide what my kids can and can't access. In fact, I can't think of a more extreme example of "We're the government, and we're here to help." When Web sites have content ratings, our jobs will become somewhat easier, but it's still up to us as parents and individuals to set our own definitions of decency and to expect appropriate behavior from our children. □

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JOHN C. DVORAK

Apple's Big Mistake

Apple Computer has reached a critical stage. The future of the company will probably be decided in the coming months. Over the years, the Macintosh has evolved into a niche machine. The Mac still owns 70 to 80 percent of the prepress and graphic-arts markets, but its share of the overall market is dropping to the single digits. And its share of the schools market, which the Mac has traditionally dominated, is being eroded.

Unlike most computer users, I've always used both platforms. Over the years, I've also tried to remain objective when comparing the two platforms. What has been difficult to understand is how the Mac, which enjoyed a decade-long head start over other graphical user interfaces, has somehow fallen into a niche. Simple explanations such as price and lack of clones begin to explain the situation, but in my opinion they don't tell the whole story.

I recently received a simple comment from a reader that made me realize the Mac will have a difficult time recovering market share from the PC, especially after Intel rolls over the market with its MMX version of the Pentium (Inside Track, April 9, 1996). The reader stated that over the last ten years Microsoft has copied or cloned idea after idea from the Mac. Meanwhile, the reader argued, Apple has paid little or no attention to developments in the PC community, let alone bothered to clone any of the notions developed by Microsoft.

There are plenty of cute ideas in both Windows 95 and OS/2 that would be appreciated by Mac owners. When the Mac came out in 1984, it had a groovy look and feel. When Windows first came out, it looked terrible. Years later, with Version 3.0, Microsoft wised up and used the artist who was responsible for much of the Mac interface. With Windows 95, Microsoft really upped the ante. Meanwhile, the Mac looks much the same as it did in 1984.

This stubbornness is reflected in Mac users, whom I thought had mellowed over the years until I perused some Mac forums and discovered the same arrogant attitude that predominated in 1984. This group causes more problems for the Mac by failing to find anything positive about the PC and Windows. It's as if this holier-than-thou contingent of Mac users has resurfaced in a last-ditch effort to rescue the platform from obscurity.

There is never any open debate from these Mac users, just ridicule. Every point and counterpoint is peppered with derisive terms such as "Windoze," "File Mangler," and "PeeCees." But on the flip side, you never hear PC users referring to the Macintosh as "Muck" or "Muckintosh." Or in place of PowerMac, the "Powerless Mac." Instead, PC users just roll their eyes and go back to work.

MAC-CENTRIC

Microsoft has copied from the Mac, while Apple has paid little attention to Windows.

This whole lame situation reminds me of what happened to the Amiga. With a true multitasking GUI operating system, genuine stereo digital sound, and honest-to-gosh NTSC video, the machine remains amazing to this day. But its users as a group were mostly jerks. We'd get letters here at *PC Magazine* claiming that we didn't write about the Amiga, that what we said was wrong, or that we didn't get down and worship the machine properly. The only difference between Amiga users and Mac users is that the Mac users had a successful computer, so they just became arrogant. Now that the Mac is perceived as failing, at least in the short term, its users are turning into clones of the Amiga crew.

This addiction to a particular platform has hurt both the Amiga and the Mac. It threatens to do the same to OS/2. Microsoft, for some odd reason, seems to work from an underdog stance despite its dominant position. The company assumes that better things may be out there and, when it finds them, it incorporates the technology into Microsoft products, such as operating systems or word processors.

This concept is not unknown to Apple, though the company seems to have forgotten it. When Apple first developed the Mac OS, it was largely a derivative of Xerox's Star. Apple borrowed plenty of ideas from Xerox to make the Mac OS what it is today. Xerox took no cues from Apple, and Star is now a part of computer history. Later, when Microsoft developed Windows, it was largely a derivative of the Mac OS. Apple has taken no ideas from Microsoft and.... I think you can see where I'm headed with this. We really need alternative platforms, because competition benefits users. Let's hope Apple gets back on track before it's too late. It can start by taking a hard look at Windows 95.

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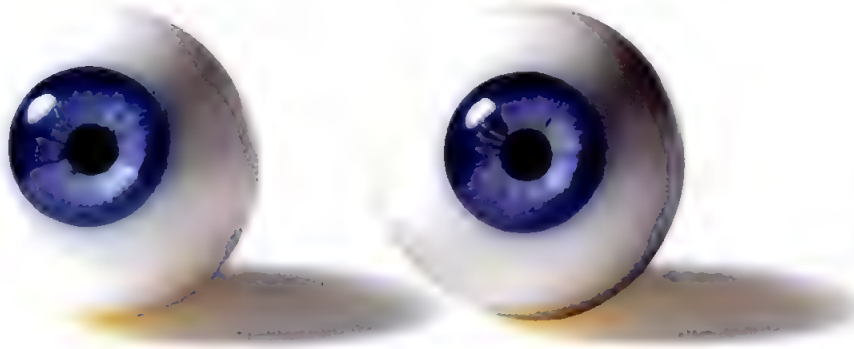

"If you stare into only one 17-inch screen this year, let it be Nokia's...," said the editors of *Home Office Computing*. Excellent advice, if you want to rub your eyes in astonishment – not irritation.

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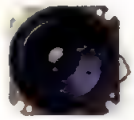

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JOHN C. DVORAK

Inside Track

Everyone Is Trying to Get into the Act Dept.: Cyrix, in an effort to step up competition with Intel Corp., has gone into the PC business. In case you didn't know, Intel makes the motherboards for four of the five top PC makers in the U.S. Except for disk drives and other minor modifications, **all these machines are the same.** The odd thing is that Intel began this business as a **marketing ploy.** By designing the systems itself, it could get new processors on the market faster and better promote its PCI and other chip sets. For their part, the computer makers could downsize their design staffs and rake in the cash. Which most did.

The technology in Compaq's LS-120 drive has been waiting in the wings for years, but not at this 120MB capacity. I think this one will stick. Let's hope so, because the 1.44MB drive is pathetic by today's standards.

Meanwhile, AMD and Cyrix found that the shortage of designers and the dominance of Intel motherboards made it harder to sell their chips. Unlike a Micronics or generic motherboard, the Intel board comes already occupied by one of the company's processors. **Cyrix** could be poised, however, to **throw a wrench into this motherboard/processor monopoly.** The company recently announced an agreement with Electronic Data Systems Corp. to sell 6x86 PCs under the Cyrix brand name. And Cyrix is bundling its 6x86 processor with qualified third-party motherboards—there's also a rumor that Cyrix is going to make its own motherboards. Nowadays, most users upgrade the entire motherboard anyway, but such upgrades have never been sold as consumer packages.

Compaq may start using some Intel motherboards now that **its minifeud with Intel seems to be over.** (It began years ago when Compaq invested in NexGen, makers of a Pentium CPU clone. NexGen has since been bought out by AMD.) Compaq may want to have Intel on its side when it attempts to create **a new floppy-disk standard** to replace the 1.44MB floppy disk drive. A few years back, Toshiba attempted to promote a 2.88MB disk, but the concept fell flat with only a few odd supporters. Since then technology has marched on while the floppy disk drive remains unchanged. Compaq teamed up with Matsushita-Kotobuki Electronic Industries and 3M to rethink this 3.5-inch format and designed **a 120MB, backward-compatible system** called the LS-120. Using some of the ideas from Iomega's succesful Zip drive, Compaq has reinvented the so-called floptical disk, which first hit the market a few years back. It's a servo-encoded disk. This type of device has been waiting in the wings for years, but not at this capacity. I think this one will stick. Let's hope so. The **1.44MB** disk is **pathetic by today's standards.**

They're Watching Dept.: I hope everyone paid attention to that international incident recently in which a kid said jokingly on the Internet that he was a 26-year-old man intending to commit suicide. Police in Redmond, Washington, who apparently have become **the worldwide suicide-watch cops,** got hold of some Internet experts and actually managed to track the message back to the boy in Perth, Australia. His dad was quite annoyed, I'm sure. While I admire the tenacity of the investigators, the episode does bring into focus how much privacy we lose as we incorporate the Internet into our lives.

Genuinely Interesting Software Dept.: When I first received this package, I thought it was both a cool idea and a cool product. But since I have no confidence in my musical skills, I passed it on to a **guitar-playing friend who raved like a maniac about the CD-ROM** Play Blues Guitar with Keith Wyatt. This is the quintessential disk for those who have dreamed of walking into a guitar store, grabbing a cool-looking guitar off the rack, and, after pausing to ask aloud, "I wonder how this baby sounds," ripping off a slew of nasty blues riffs.

The program is aimed at teaching guitarists to play electric blues guitar, but newbies could also get a lot out of it. Using over 100 minutes of video clips and excellent teaching technique, Play Blues Guitar is **a model CD-ROM for instruction.** It's a fabulous product. **Highly recommended.** Play Blues Guitar ($59.95) is available direct from Play Music Inc. at 800-887-7529. I'll stick to "air guitar."

How Low Can They Go Dept.: As you may already know, the lower the voltage of a solid-state device, the lower the power requirements and the better suited it will be to a battery-operated system. I was stunned to learn that the next generation of Pentium processors will be 2.9-volt parts. Amazing, huh? Not when compared to the **incredible 0.5-volt ICs shown by Toshiba** at the annual International Solid State Circuits Conference in San Francisco. Imagine the battery life of a machine using such technology. I'm guessing that someday an entire computer will be **powered by static in the air** and require no batteries whatsoever. There's an ambitious prediction for you.

Coincidence Dept.: I read an interesting account of Fujitsu's announcement that it will expand into the North American PC market by forming the Fujitsu PC Corp. and rolling out high-performance Pentium-based notebook PCs by summer. Though the company is based in Milpitas, California, Fujitsu said its new production facility will be in Hillsboro, Oregon. Gee, **that unlikely location** is exactly where **Intel** has its newest plant, which makes OEM laptops. Fujitsu says it wants to focus on the U.S. with "U.S.-based design, engineering, and manufacturing." Yeah, right. □

O'Hare Airport: 4.3 miles of terminals.

Dallas/Ft. Worth: 4.8 miles.

Denver International: 3.2 miles.

(It occurred to us you might want a lighter notebook.)

intel inside pentium

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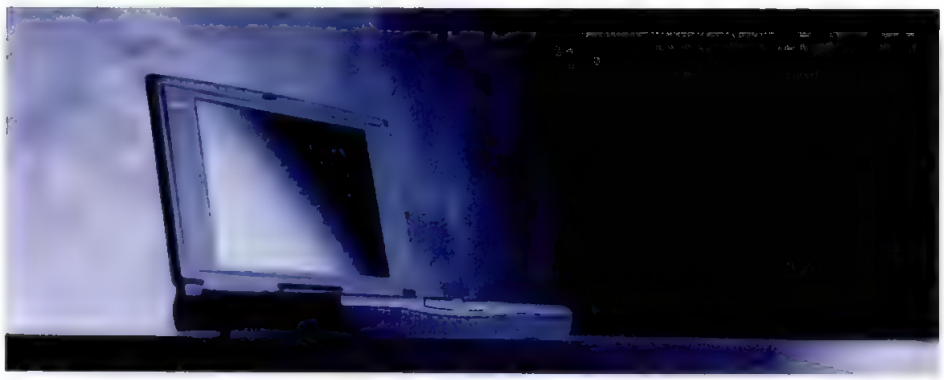
Of course, it also occurred to us that you don't want to lose features while losing weight. Thus, the new AcerNote™ Light notebook computer offers a Pentium® processor, full-size keyboard and large 10.4" color screen.



But it still weighs just 5.8 pounds. Which we think you'll appreciate when you're traveling from, say, Dallas to New York. Half the distance of which is covered while walking to the gate. ACER

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CIRCLE 086 ON READER SERVICE CARD

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CIRCLE 087 ON READER SERVICE CARD

JIM SEYMOUR

Weaving That Old Web Magic

That old Web interface has us in its spell/That old Web interface that we know so well. With apologies to Johnny Mercer and Harold Arlen, that says it perfectly. We know the Web interface—how to use it, how to navigate within it, how to go forward and backward, and the rest of it. And now many of us are starting to say we want to stay within that familiar paradigm for a lot more of our computer work, within that black magic that we know so well.

The impact and popularity of these new "Web apps" would be hard to overstate. On four of my last five trips to corporate clients, I've been asked to work on bringing some of those companies' everyday procedures under the Web umbrella by developing HTML front ends for new custom applications. One company wanted an online order-entry system; another, a quick inventory-checking system; a third, an expense-account filing system; a fourth, a professional-time billing system. Three of the projects are now well under way, with two already in limited use.

HERE AND NOW

Intranets are here *now*; Java, for all practical purposes, is still a bet on the future.

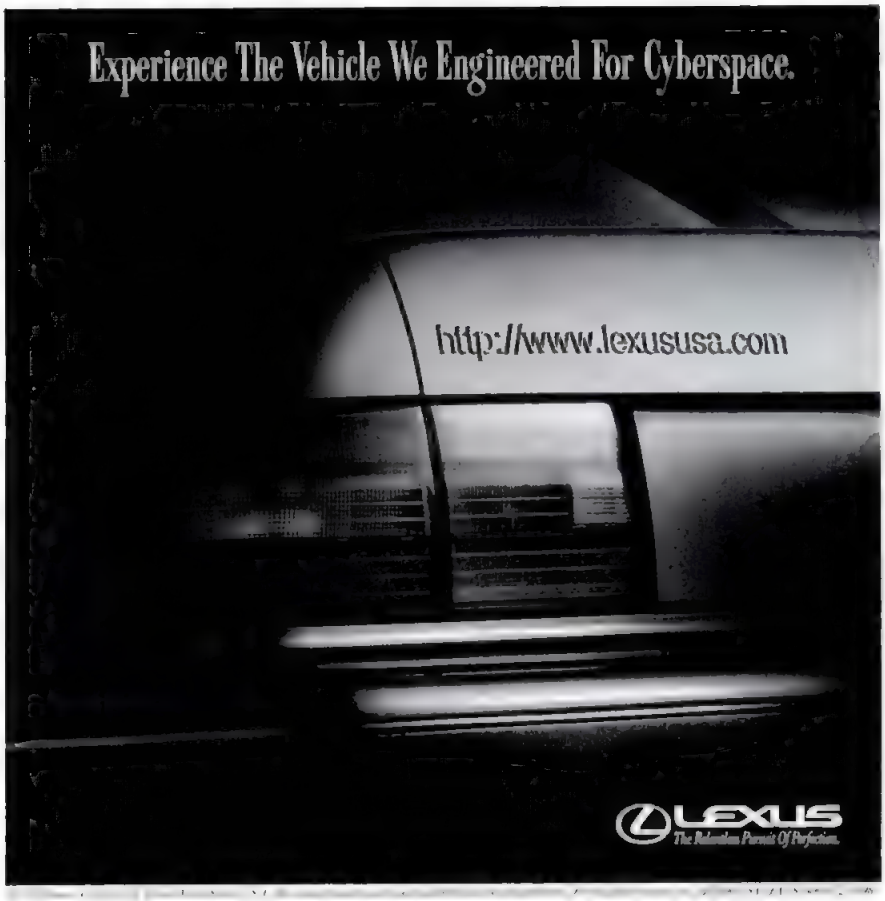
Talk about rapid development and rapid prototyping: The oldest of those efforts was begun less than three months ago. It's wonderful how quickly you can cobble together and put up for testing simple HTML-interface apps; sometimes it just takes days. At first I thought we'd use HTML front-end systems only as prototypes to test users' reactions, then rebuild them as true client/server apps. I was wrong. A lot of these "Web apps" are going to be long-lived, production-level applications. In my last column, I talked about the boom in intranets and how important these private, in-house Web sites have become. Along with Sun's Java, intranets have become the hottest Web-related topic. But there's a fundamental difference: Intranets are here *now*; Java, for all practical purposes, is still a bet on the future. Sun has shipped Java 1.0, but it's hardly a robust or deep tool set. Indeed, as entranced as we are with the idea of Java, this first iteration has led programmers I respect to wonder if Java will ever become as big a force as the hype now promises.

The kind of Web browser–accessible applications I see companies building—like those I mentioned above—are housed on intranet servers, but they're not being written with Java. Instead, these apps are being built with HTML front ends backed up by Common Gateway Interface (CGI) links to connect them to in-house databases. Yes, CGI is an unlovely thing, and yes, it's limited, too; but as sexy as Java may be, CGI is a production tool. It lets in-house developers put up usable Web apps today, not someday. (Wondering if CGI is really of value in the corporate world? Just try to find an experienced CGI programmer who's available. If you succeed, be prepared to pay a stiff price.)

I see a dramatic split between those shops where the interest in creating Web apps is high and those where the notion seems just to have arrived from Mars. The difference? Predictably, it's whether or not there's already wide access to the Web for company employees. In those shops where a large number of workers already have Netscape Navigator or another Web browser on their machines and use it regularly, there's a push from those users for in-house Web apps. Less predictably, there's also significant demand in those companies from workers who have Navigator on their machines but virtually never use it. The buzz factor is so high for the Web in general—and Navigator in particular—that even those who never load a browser, and wouldn't know a URL from a UFO, are predisposed to accept the idea of new custom apps with Web front ends. Only in companies where the Web is something they read about in the newspapers do I find a lack of interest in corporate Web apps.

That predisposition toward new Web apps spells *opportunity* for corporate and commercial developers alike.

And it makes sense: While computer enthusiasts like you and me certainly tolerate and often look forward to learning a new program, most office workers shudder at the very idea; they much prefer that any new tools added to their machines use what appears to be an old, familiar interface. You and I may know that what's going on behind the scenes when a custom HTML input screen passes inquiries and data through a CGI routine to a corporate database is very different from what's going on when we use Navigator to search Yahoo or check ESPNet Sports-



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JIM SEYMOUR

Zone scores. But the great majority of our coworkers are blissfully unaware of that backroom work. They just want to click, enter, go Back and Forward, load company forms through Bookmarks, and Reload when they need a fresh, blank form.

CGI doesn't bring a richly aesthetic level of interactivity to Web apps, but it does give them solid links without clogging up the network. CGI won't be the enduring answer to developing custom Web apps—or at least, not the *only* widely used answer. Java is an appealing idea and will become an appealing product soon enough. Especially as third-party shops such as Symantec jump on the Java bandwagon with smart tools and extensions, Java is becoming an important language. And the momentum behind Java—never discount the commercial value of a high buzz factor—means that we'll see succeeding releases quickly.

General Magic's Telescript has also been retooled to serve as a vaguely Java-like language for bringing interactivity to Web apps. Telescript never lived up to its hype as the language of choice for PDA apps—or was it that PDAs never lived up to their hype, so Telescript never had a chance to show its stuff? I suspect Telescript will do better in the Web Era *if* General Magic can get the product into enough developers' hands quickly.

Telescript and its "agents" have one big advantage over Java for many corporate applications: Java is focused on the client side of the transaction, while Telescript is focused on the server side, thus providing important advantages in security and manageability. And Telescript agents can do their work while a user is off-line, then report back when he or she is online again.

The (very) bad news: For now, Telescript supports only Unix, not Windows or Mac. You can get more information on Telescript's rebirth as the core of what General Magic calls "Active Web Tools," producing "Active Personalized Services," as well as a free CD-ROM developers' toolkit, at *http://www.genmagic.com.*

For now, CGI links are the right answer; they are the glue that lets corporate developers get new custom apps out the door and onto their intranet servers quickly. Your users won't know or care what goes on behind their browsers' familiar faces; they just want to stay with that old Web magic they know so well. □

BILL HOWARD

The Dumb Terminal Is Just That

When former New York governor Mario Cuomo was harboring ambitions of the White House, according to an apocryphal story, Lucifer appeared before him and made this offer: "Mario, it is within my power to make you president. All I ask is that when you leave office, your soul belongs to me." Without hesitation, Cuomo replied: "Fine. But what's the catch?"

Lately, otherwise rational people have been suspending disbelief over the $500 Internet appliance and pushing up shares of any company claiming to have one. What few people realize is: It isn't a PC, it can't run existing software, it requires a monitor or a television set, and for $500 it may not even include a high-speed modem. "Fine," would-be users say. "But what's the catch?" Until now, I've held off on writing about the Internet appliance, because it's been written to death and because I thought savvy users would understand what's missing. Here are the catches.

RENT-TO-OWN
It is one of the biggest scams. Instead of TVs and furniture, this time it will be the Internet.

• It won't be a PC. It will be a black box and keyboard that you attach to your TV. Maybe it will have some local storage, but more likely it won't—at least not in 1996 and certainly not for $500. Users would download Java applets to perform specific tasks. Once Java is involved, you've got to wonder about the speed (it's an interpreted language). If vendors hardwire Java functionality into the box, the cost will increase, and the systems may not be universally compatible. Not to mention the potential privacy issues involved in storing your data on the world's network.

• It won't be a speedy communicator. A 14.4- or 28.8-Kbps modem is cheap enough for a $500 device, but it isn't fast enough. ISDN is just about fast enough, but it's too expensive (the modem and the ISDN service both). Cable modems could be a solution, but not in 1996 for most of the U.S.

• Why rent when you can own? Some of the low estimated costs of this device are predicated on the user committing to a service provider for two years at rates that subsidize the equipment. Rent-to-own is one of the biggest scams foisted on lower-income families. Instead of TVs and furniture, this time it will be the Internet. There's some anecdotal evidence that families with incomes as low as $20,000 will try to find a way to acquire a PC. The Internet appliance is the *Encyclopaedia Britannica* of the 1990s, minus the wooden display rack to show it off to the neighbors. In both cases, what you're buying is hopes and dreams—a chance for your kids to do better in school. Parents in middle– and lower-middle–income families see computers as great equalizers. A PC, they believe, will give their kids the same shot at getting into Stanford as little Ashley and Ryan from Greenwich, Connecticut.

Nowadays, a functional multimedia Pentium PC costs as little as $1,499, which puts it within reach of many of these families. Once it breaks the $1,000 barrier, the PC will be downright compelling to families at nearly all economic levels. We're already halfway there.

During one of this winter's interminable East Coast snowstorms, I spent two days holed up in a Midwest airport with the VP of technology for a top-ten PC vendor. To pass the time, we costed out on a cocktail napkin a low-end "real PC" that an aggressive vendor might put together. Here's the breakdown: a Pentium CPU (75 MHz for now), $100; 8MB of RAM, $200; a 1GB hard disk, $125; a CD-ROM drive, $60; a floppy disk, $20; a motherboard with on-board sound and video, $125; a case, a power supply, a keyboard, and speakers, $50; a 14-inch color monitor, $100; a modem, $25; licensing rights to Windows and applications, $100; assembly and documentation, $20; a warranty and support plan, $50; overhead and profit for manufacturer and dealer, $300. Total price tag: $1,275. *For a real computer.* Aggressive but routine component-price reductions should get us to a $999 PC by the holiday buying season. If you must have a PC for $500, I think you'll be able to find a used 486 for that price.

• Users of Internet appliances will be the second-class citizens of the computing world. There, I've said it. No matter how good the Internet is, no matter how much promise it holds, having a way-cool Internet set-top box is going to do less for most families and individuals than a 486DX2/66 PC with a CD-ROM drive, Microsoft Works, an encyclopedia, and a subscription to AOL. To me, an Internet-only appliance will make the most sense for those families that already have one or two PCs at home and want an additional device for the busy evening hours. □

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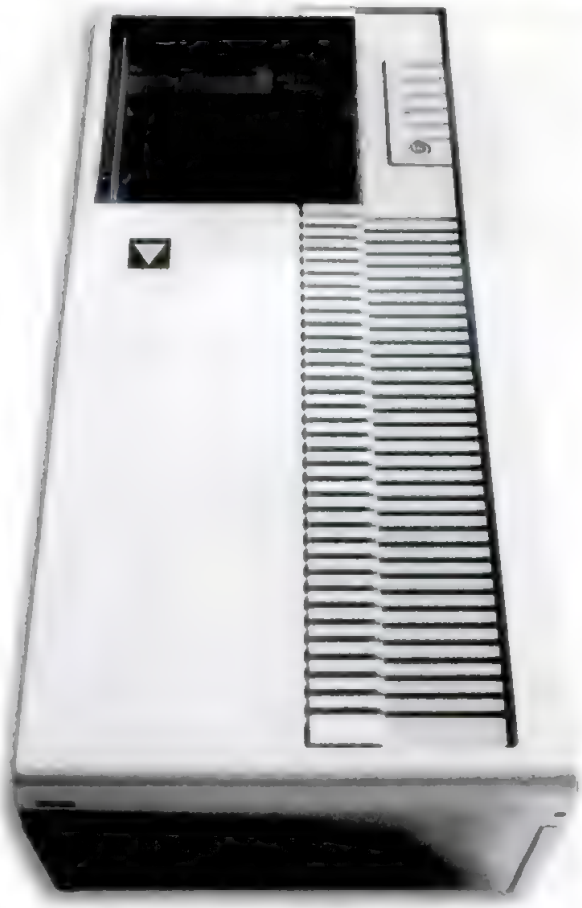

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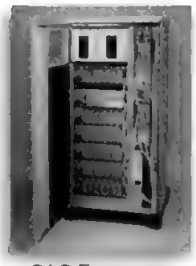

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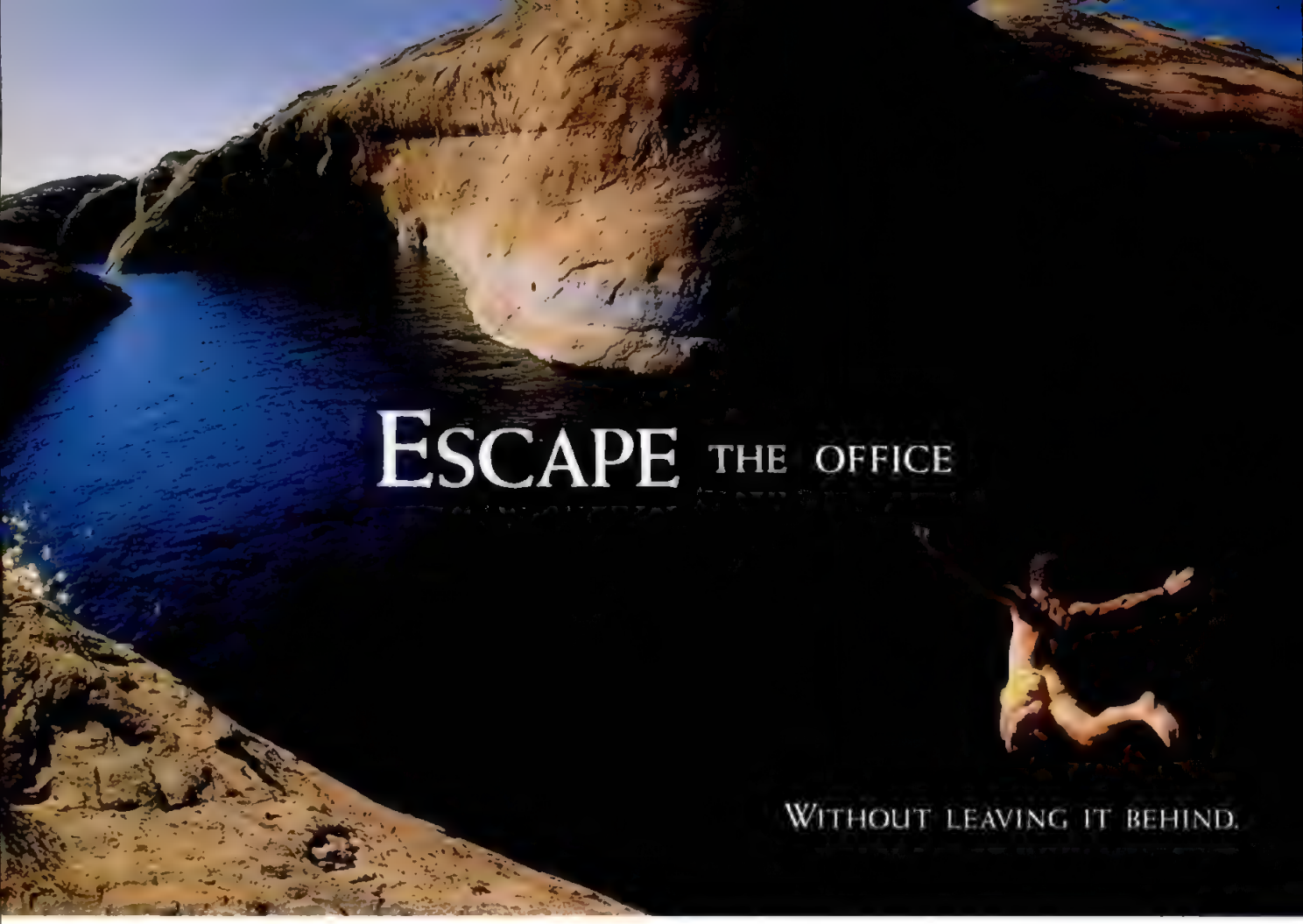

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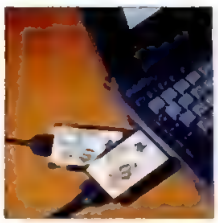

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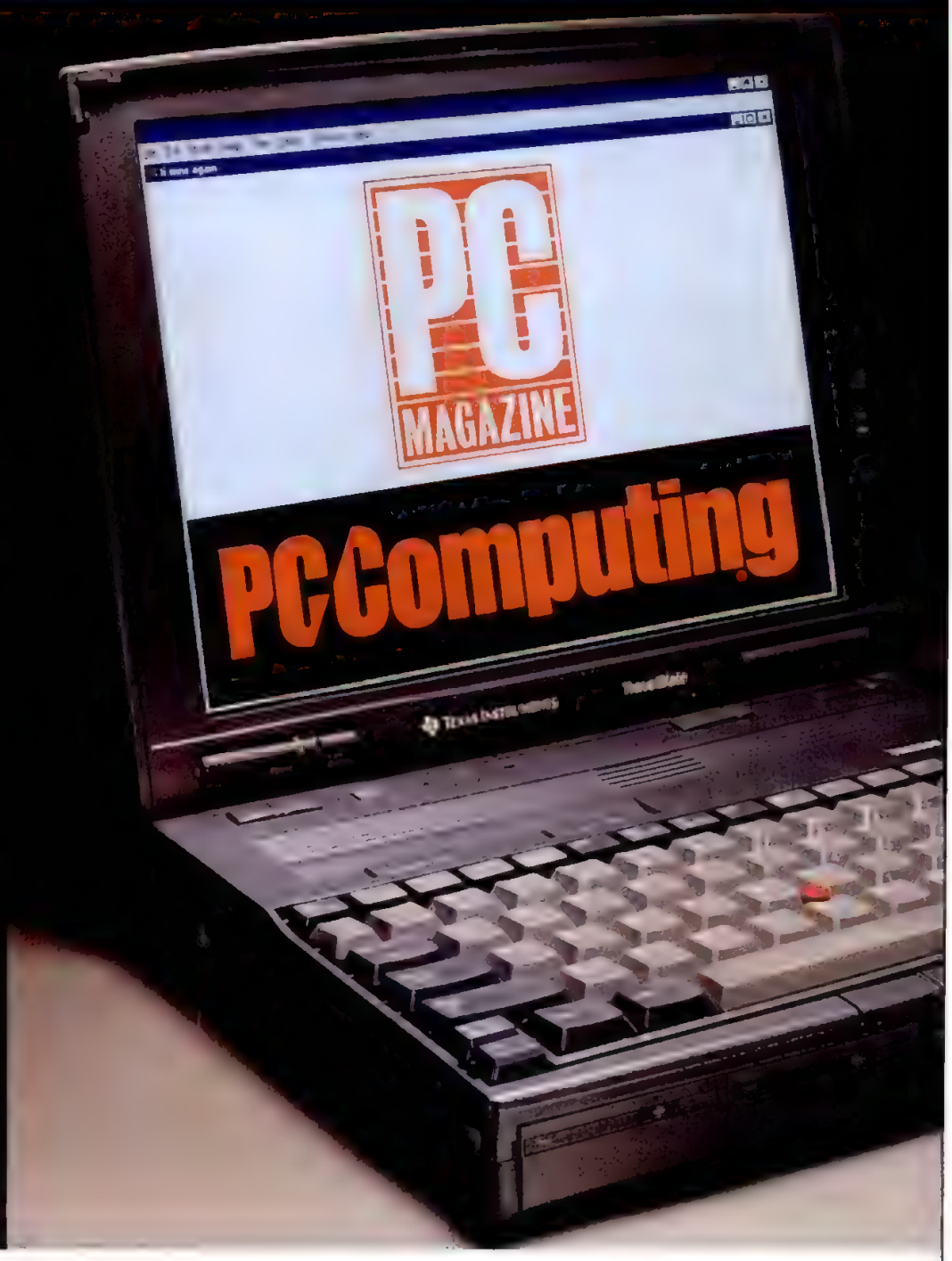

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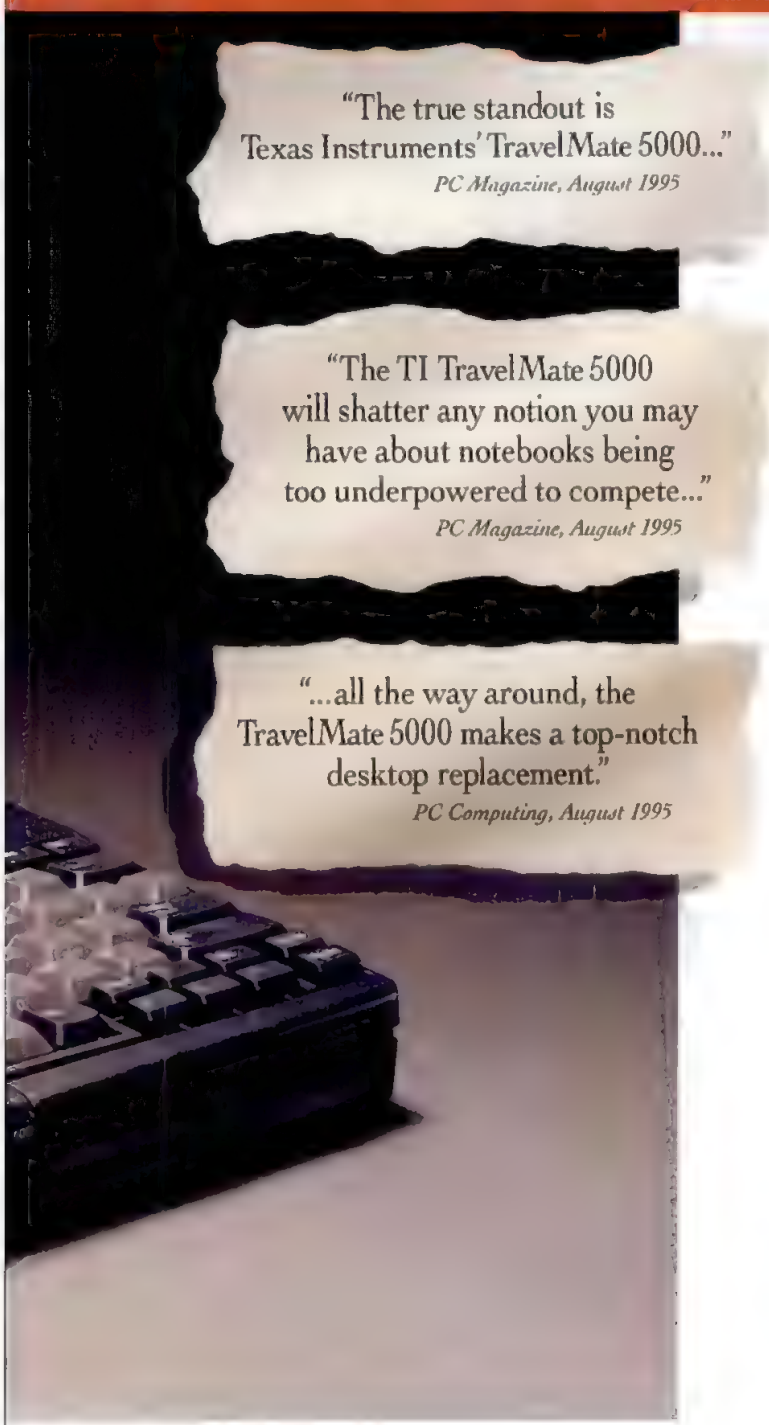

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CIRCLE 246 ON READER SERVICE CARD

THE ULTIMATE

WORK BETTER AND SMARTER BY OUTFITTING YOUR PC

Software utilities are a lot like all the tools hanging in your garage. Each one has a very specific purpose, and even though a tool may sit unused for weeks or months at a time, you're awfully glad it's there when you need it.

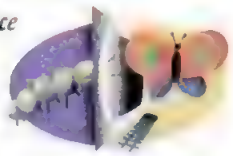
In this 14-part cover story, we evaluate utilities—or tools—that help make your computing life easier. Do you want to change the look of your desktop? Maximize your memory? Uninstall old applications cleanly? Protect your system from viruses? Run regular backups? Diagnose hardware problems? No matter how many bells and whistles Microsoft continues to add to its operating systems—and Windows 95 has plenty—there's always room for improvement. We focus here primarily on commer-

By Lance Ulanoff

THE BASICS

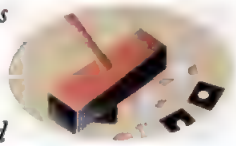
Windows 95 includes its own new utilities, the Plus! Pak adds more, and Norton Utilities satisfies many needs. Is that all the utility power you need? **Page 107.**

DESKTOP ENHANCERS



No one interface can be right for everyone. Fortunately, it's easy to change the way Windows 95 looks and behaves if you add one of these eight interface makeovers to your desktop. **Page 115.**

UNINSTALLERS



Windows apps spread themselves out all over your hard disk. It takes the talents of an uninstaller to remove them cleanly, completely, and safely. We test the three competitors. **Page 135.**

ANTIVIRUS UTILITIES

Whether you work alone or in a group, protecting yourself against viruses is a good idea. We put virus catchers through tests on standalone PCs and on LAN-based systems. **Page 143.**

FILE VIEWERS

You'll work faster if you don't have to spend lots of time opening up specific apps just to look at specific files. A universal file viewer is just about the handiest utility you can have. **Page 163.**

MEMORY UTILITIES

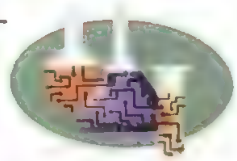
Does Windows 95 render traditional memory managers obsolete? Not necessarily. Vendors are pulling new tricks out of their sleeves. PC Labs tests their effectiveness. **Page 169.**

ILLUSTRATIONS BY TERRY ALLEN

UTILITY GUIDE

WITH SOME OF THESE 170 PROBLEM-SOLVING TOOLS.

DIAGNOSTIC UTILITIES



Take a knowledgeable peek inside your PC without turning a single screw. These five utilities alert you to problems you may be having with your hardware and offer good advice. **Page 175.**

NETWORK BACKUP UTILITIES

As you add utilities to equip your PC for optimal use, don't forget about backup. PC Labs tests four NetWare-based backup utilities that help keep your data safe. **Page 181.**

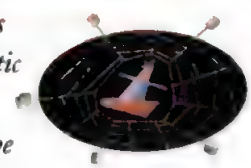
MORE ESSENTIAL PROBLEM SOLVERS

Compress files, save your screen, balance colors, and tie apps together. Our experts have found 11 great utilities that tackle pesky little productivity problems. **Page 187.**

OS/2 UTILITIES

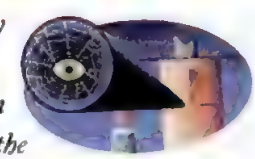
Users of OS/2 Warp have their own grab bag of utilities. We test 30 desktop enhancers, uninstallers, antivirus utilities, memory managers, disk utilities, and backup tools. **Page 191.**

INTERNET ORGANIZERS



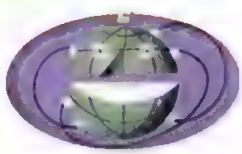
Something as big and chaotic as the Internet needs to be tamed. These six organizers and trackers handle the job of keeping all of your online activities in line. **Page 197.**

INTERNET SEARCH TOOLS



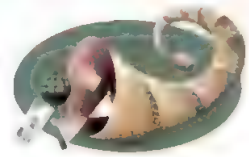
Here's a way to save money when you explore the Internet: Do your searching offline. We test ten products that provide Web indexes with which you can explore the Web. **Page 207.**

INTERNET PLUG-INS AND HELPERS



The way to keep your Web browser up-to-date is to accessorize it with all the latest Internet bells and whistles. Here's our Web experts' list of essential add-ons. **Page 212.**

MORE INTERNET UTILITIES



From cybernannies that childproof the Web to connect-time clocks, file downloaders, and e-mail clients, these 20 diverse utilities help you maximize your Internet experience. **Page 214.**

JOIN US ONLINE

From April 22 to 26, *visit PC MagNet on CompuServe to discuss uninstaller utilities with contributing editor Edward Mendelson and vendor representatives (GO EDITOR).*

On the Web, *visit* www.pcmag.com *for a discussion of the latest trends in antivirus software.*

cial (no shareware), Windows 95–specific utilities, but we've also included a section on OS/2 utilities.

There are other utility categories that warrant coverage, but most lacked enough commercial competitors to merit comparative reviews. We discuss some of the more useful ones in our "More Essential Tools" section.

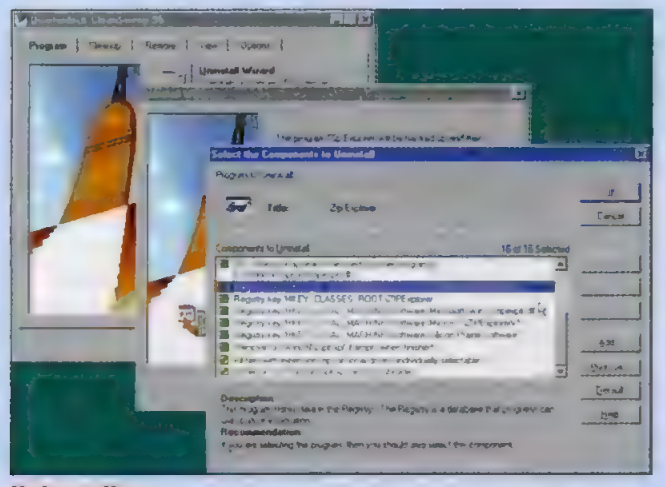
START WITH THE BASICS

It's common knowledge that underneath Windows 95's pretty face is DOS 7.0. Windows 95 still features some of your favorite utilities, but others have been removed. As a result, we think it's a good idea to start out with a good utility toolkit, like Norton Utilities and Windows 95's own enhancement, the Windows 95 Plus! Pak. For more details, see the section "The Basics." You'll also notice that in our sidebar "What Makes a Great Utility?" we offer some highlights from the 100-plus utilities we examined. Though you may not need all of these utilities, this should serve as a helpful guide when you make your buying decisions.

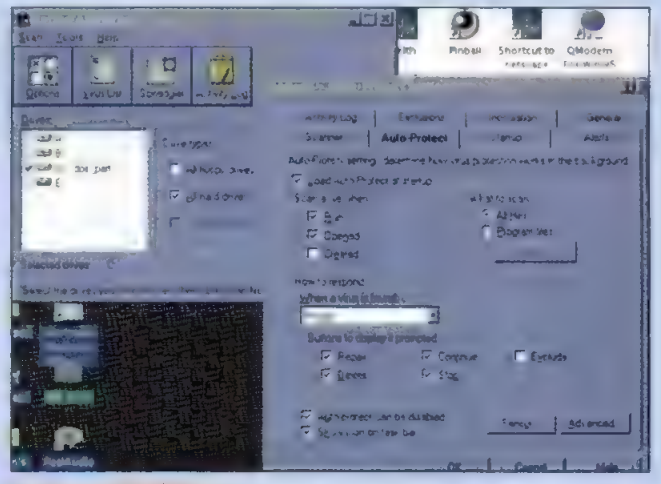
This year, we're also witnessing an explosive growth in Internet utilities. It's a display of energy and creativity, the likes of which we haven't seen since the first days of the PC. All of a sudden there are hundreds of products to help you take advantage of the Internet's many facets. We've broken them down into three main categories: organizers, search tools, and plug-ins.

Internet organizers and trackers provide specialized tools for capturing and organizing sets of URLs and bookmarks, or for storing and organizing material you've captured from the Web. Internet search utilities provide databases and reviews of Web content, typically on CD-ROM, so that you can refine your searches before you log on and start

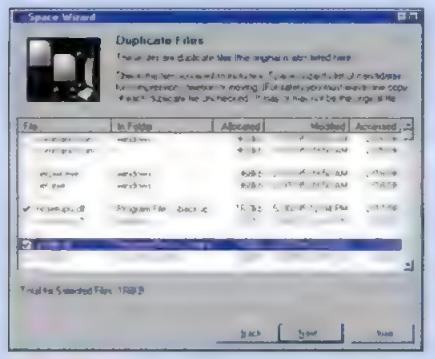
What Makes a Great Utility? *Among the dozens of utilities we looked at, several stand out*



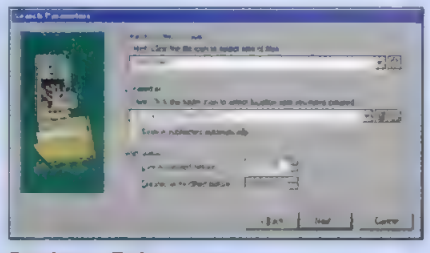
Uninstallers Quarterdeck Corp.'s powerful CleanSweep 95 is the only application uninstaller that reports the exact changes it will make to the Windows 95 Registry. Other applications tell you only that the Registry will be changed without giving any details.



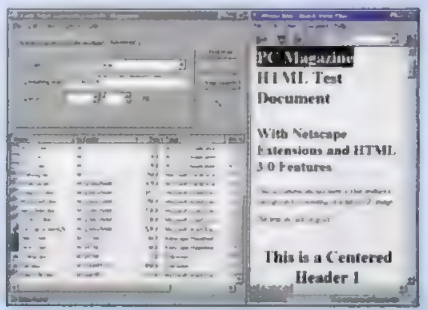
Antivirus Utilities Windows 95 is somewhat safer from virus attack than Windows 3.1 was, but it's not impervious. Auto-Protect real-time scanning in Symantec Corp.'s Norton AntiVirus for Windows 95 adds the necessary layer of protection to make your system safe from virus attack



The Basics Symantec Corp.'s Norton Utilities adds much-needed tools to Windows 95. Among them is the Norton Space Wizard, which finds duplicate and nonessential files and lets you delete them to recover storage space on your hard disk.



Desktop Enhancers Symantec Corp.'s Norton Navigator adds some welcome intelligence to Windows 95's file management abilities. The File Archive Wizard, for example, scours disks for files of specified categories and ages to be compressed or deleted.



File Viewers Quick View Plus from Inso Corp has far more power than the limited version included in Windows 95. When you use Windows 95's file finder to search for files that contain specific text and then display them with Quick View Plus, the text you searched for is highlighted in the file

paying connect charges.

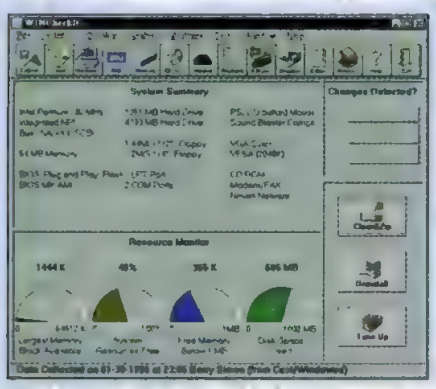
Helper applications and Netscape plug-ins constitute a universe of functionality on their own. Designed to extend your browser's capabilities in specialized areas, they make the Web a conduit for everything from interactive spreadsheets to live video broadcasts to virtual 3-D worlds. Out of the hundreds of helper applications and plug-ins now on the Web, we pick the top 30 in four areas: audio, graphics, video, and virtual reality.

You'll also find an extra section focusing on 40 more Internet utilities in five different categories. No matter what you use the Internet for, you can use it more effectively with the help of some of these tools.

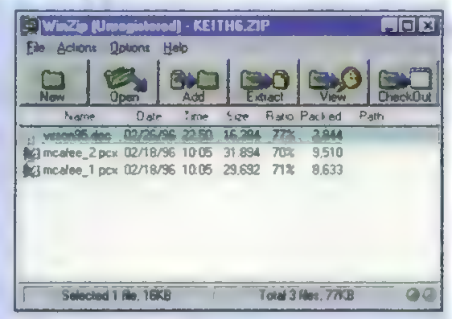
The emergence of the Internet and the release of Windows 95 are changing the way you compute, but one thing has stayed the same: You still need your tools. In fact, you should probably go out and get some new ones.

Our Contributors: PADRAIC BOYLE, SHERYL CANTER, EDWARD MENDELSON, STEVE RIGNEY, WINN L. ROSCH, BARRY SIMON, and CRAIG STINSON are contributing editors of *PC Magazine*. DAVID HASKIN, ESTHER SCHINDLER, and KEITH SCHULTZ are frequent contributors to *PC Magazine*. DR. RICHARD FORD is the director of research for the National Computer Security Association. THOMAS MACE is a senior editor, and LANCE N. ULANOFF is a senior associate editor of *PC Magazine*. DAVID LIDSKY and MICHAEL W. MUCHMORE are staff editors, and EYAL RABINOVITCH is an editorial reseacher at *PC Magazine*. BEN Z. GOTTESMAN and LARRY SELTZER are technical directors, and JAY MUNRO and DAN SMITH are project leaders at *PC Magazine*. DON WILLMOTT was the executive editor in charge of this story.

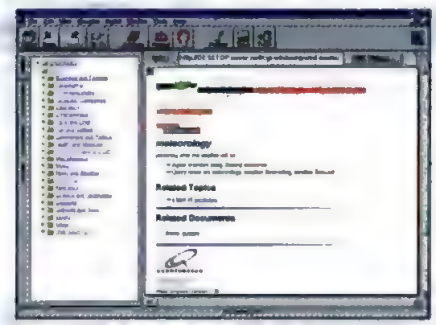
for their intelligence, efficiency, and effectiveness. Here are some highlights.



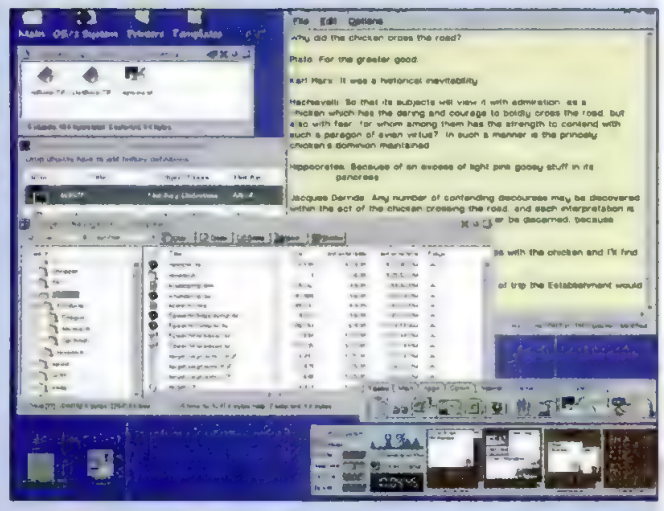
Diagnostic Tools Though Windows 95 includes some basic system diagnostic tools, they can't compare with TouchStone's WINCheckIt.



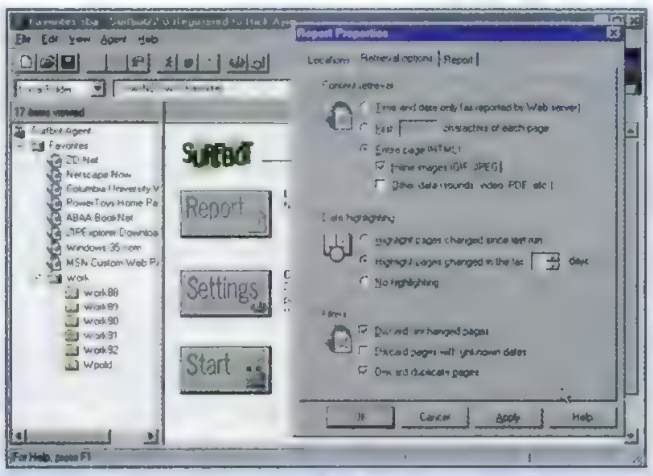
Archive Utilities No Windows 95 desktop should be without a file archiving utility, and Nico Mak Computing's WinZip 6.0 is the one to have. Its small yet efficient interface blends nicely into the Windows 95 interface.



Internet Search Tools The Web is too big to skim like a book. You need some heavy-duty tools to help you dig deep and find the Web info you're looking for. Quarterdeck WebCompass 1.0 is that tool. It offers extensive databases with entries organized by topic.



OS/2 Utilities OS/2 users have a cornucopia of utilities to select from, but few are as versatile as Stardock's Object Desktop. Among the dozens of features are an excellent file manager, Alt-Tab support, a better task list, and .ZIP file viewers that treat the contents as desktop objects.



Internet Organizers The more you surf the Web, the harder it is to keep track of the latest changes to all your favorite sites. Fortunately, Surflogic LLC.'s Surfbot automates the process. It offers powerful and flexible update notification, the greatest range of functions, and the closest integration with Windows 95 and current browsers.

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Drive Bays (Total)	3	3	5	5
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Security Features	Yes	Yes	Yes	Yes
Processor Upgradable	Yes	Yes	Yes	Yes
101-Key Keyboard, Mouse	Yes	Yes	Yes	Yes
Software Preinstalled (Choice of)	Windows® 95 or Windows 3.1	Windows 95 or Windows 3.1	Windows 95 or Windows 3.1	Windows 95 or Windows 3.1
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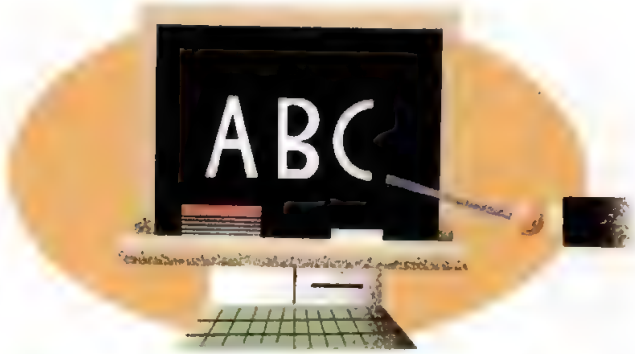


THE BASICS

WINDOWS 95 LACKS A FEW NECESSARY TOOLS. HERE WE LOOK AT THE BASIC SET OF TOOLS THAT WILL MAKE YOUR WINDOWS 95 SYSTEM MORE COMPLETE.

By Winn L. Rosch

The usefulness of any tool depends on the job you have to do, and most software manufacturers craft utilities to fill some similarly specific needs. You might want a better desktop than the one Microsoft chooses to give you, an expedient way of dispensing with software you no longer want, a means of converting data files from one format to another, backup and antivirus protection for your files, improved memory handling (and more free bytes), or diagnostics for finding system problems. Each of these needs has spawned its own array of specialized utilities, which we will cover separately in the reviews that follow.

Some utilities, however, are useful to nearly everyone and every PC. No matter what kind of PC you have or what you do with it, you want to keep your disk organized and running at top speed, to prevent disasters by detecting disk problems and viruses, and to save your sanity should you accidentally erase a file. Your operating system should incorporate these basic functions, and while some do, some do not.

Speculating as to why your favorite operating system shortchanges you on these basic functions may make for interesting discussions, but the more useful strategy is to take action and decide what you need to add.

GETTING STARTED

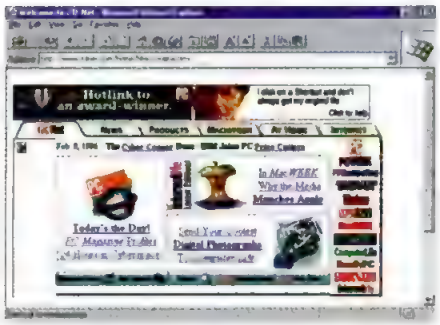
Two utility packages rank foremost on any list of utility add-ons. Microsoft Plus! plugs many of the holes still left in Windows 95, adding Web access (though you can now get Internet Explorer for free with the Windows 95 Service Pak). It also includes a program scheduler, prettier screens, enhanced disk compression, and more. Symantec Corp.'s Norton Utilities betters the built-in Windows 95 functions by sidestepping their constraints while adding options and power. Together, these two packages make up the utility basics for any PC.

Windows 95 comes with an impressive array of utility functions, mostly for the everyday maintenance of your system. Some utility programs are so necessary and common that they were regarded as part of DOS from the start and now accompany Windows 95. These include CHKDSK, DISKCOPY, FORMAT, and FDISK. Two more recent additions to standard DOS equipment have been carried over as well: ATTRIB allows you to mark or unmark files as read-only or hidden, or alter the archive bit for exacting control of your backups; and DOSKEY lets you edit the DOS command line or assign sequences of text and commands to individual keys. And Windows fills basic communications needs with its standard HyperTerminal, built-in e-mail and fax facilities, and dial-up networking.

The Windows 95 Recycling Bin gives you a second chance should you accidentally delete a file or folder, and replaces the Undelete utility that was included with previous DOS versions. Its safety net is incomplete, however, as it doesn't catch the removed files that didn't make it into the recycling bin—those eliminated by

uninstalling a program or deleted at the DOS prompt, for example.

For normal disk maintenance Windows 95 offers ScanDisk, which finds the lost clusters that Windows manufacturers with abandon, fixes cross-linked files (two files that include the same allocation unit), and runs a surface test to find bad sectors. Useful (and necessary) as it is, the 16-bit ScanDisk has severe limitations. For example, it truncates cross-links by default, and it gives you few options for control.



Microsoft Internet Explorer's main screen includes a tabbed interface for easy navigation.

DriveSpace 2, the Windows 95 disk compression system, suffers the same indignity. Although it can nominally double your disk storage capacity by packing data more efficiently, DriveSpace 2 is encumbered by 16-bit code. Moreover, Microsoft has limited DriveSpace 2 to volumes no larger than 512MB, when drives of a gigabyte or more really constitute the standard nowadays.

Microsoft Backup, also included with Windows 95, helps you organize and make tape backups of your disk files. Again, however, Microsoft has limited this utility to a few slower and lower-capacity tape drives by including Colorado, Conner, and Iomega, and Wanteg QIC-40, -80, and -3010 drives connected to a floppy disk port or Colorado drives linked through a parallel port.

Microsoft Diagnostics (the program MSD.EXE) accompanied versions of DOS through 6.22 to tell you the details of your systems as an aid in expanding or troubleshooting your PC. Windows 95 omits MSD in favor of Device Manager (part of the System function in Control Panel) which does a much more thorough job—at least as well as many aftermarket reporting programs do. Windows 95 also includes the old DOS program MEM to report memory usage. Microsoft has built memory management into Windows 95 and requires no external utilities in this capacity.

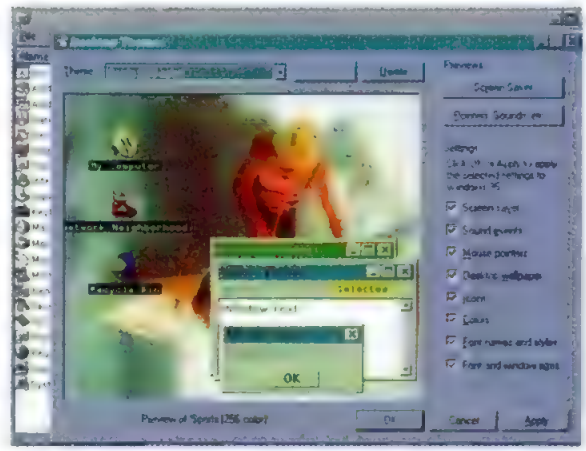
Windows 95 also incorporates minimal internal virus protection. Although it lacks scanning software to detect viruses, Windows 95 warns when programs threaten to change vital disk contents (like the boot record, partition table, and system files), and it automatically checks the integrity of its own files when you boot up.

To help monitor your PC's microprocessor load, Windows 95 also includes System Monitor, which opens a windows with a resource-use display; Resource Meter, which puts a simplified, four-step indicator on your start bar; and Net Watcher, which monitors network traffic.

MICROSOFT PLUS! FOR WINDOWS 95

The $54.95 Plus! package from Microsoft Corp. (800-426-9400, 206-882-8080) adds basic functions not included on the Windows 95 CD. They would have fit in terms of disk space but not in universal appeal or, really, in terms of Microsoft's plans.

Most of the space on the Plus! CD is filled by Desktop Themes, software for dressing up your PC should you tire of murky green screens and enthusiastic but uninspired synthesizer riffs. More than just a colorful background, a theme includes wallpaper, sounds, cursors, and icons all designed around a central concept such as wild beasts and bugs, tie-dye and free love, action sports, or Renaissance and early 20th Century technology. Open the new Desktop Themes folder that appears in your Control Panel, and you can use the Themes engine to empower your own creativity. You can pick and choose pieces of themes—wallpaper from one, prettier system icons from another.



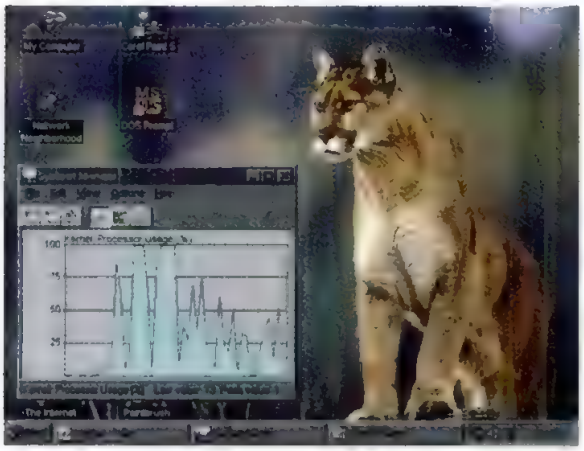
The Desktop Theme configuration screen from Microsoft Plus! lets you control a multitude of desktop details.

Plus! also includes System Agent, Microsoft's scheduling system for Windows 95 which allows you to set functions and utilities to run automatically at pre-appointed times. You can set your own schedule or let System Agent choose its own. (It favors the wee hours). But it can extract a toll, at times swallowing most of the speed of a 66-MHz 486DX/2. On two test systems, it brought keystroking to a near halt every 15 minutes even when nothing was scheduled (a problem Microsoft was unable to duplicate, let alone explain).

The DriveSpace 3 disk compression included with Plus! (which won an Editors' Choice in our evaluation of disk compression tools, "Picking Up the Pieces," November 21, 1995) improves on Windows 95's standard DriveSpace 2 with options to let you balance speed and capacity, higher compression ratios, and improved performance. DriveSpace 3 adds two advanced compression options: HiPack, which works on the fly and promises to squeeze an extra 10 to 15 percent (Microsoft's figures) from your hard disk; and UltraPack, which runs off-line, typically at night as scheduled by Compression Agent, and wrings out the last available byte.

On our tests, DriveSpace HiPack 3 proved slightly faster than its forebear. The improvement ranged from a 10 percent boost on uncompressible files (from 40.5 to 36.6 seconds to write 10MB) to 30 percent with highly compressible files (from 19.4 to 13.2 seconds to write 10MB). On tests of its overall performance, DriveSpace 3 slowed the system by about 10 percent on an 8MB 486/33 and less than 3 percent on a 16MB Pentium 90. (For a full review of DriveSpace 3, see "Picking up the Pieces," in our issue of November 21, 1995.)

The Plus! CD also includes Internet Explorer, Microsoft's answer to Netscape Navigator. Although less acclaimed than Navigator, the Mosaic-based Explorer does integrate well with Windows 95. Note that Plus! actually includes an obsolete version of Explorer. When you first log in, Plus! offers you a download of the current version (2.0) for free. You can also download it free from Microsoft and other sources. A review of Explorer 2.0 appears in "Just Browsing" in our issue of March 12, 1996.



Along with the nature theme desktop, Microsoft Plus! also includes the system monitor.

To coax you over to using Microsoft as your Internet provider, Plus! includes 10 hours of free Internet access through the Microsoft Network, which is equivalent to a month's free access just for dialing in. Plus! annoyingly installs the Explorer icon along with MSN and your inbox icon semi-permanently on your desktop—if Windows hasn't already done so—but you can move them with an add-on utility such as TweakUI.

You can make your PC into your own server—though not on the Internet—with the Dial-Up Networking Server included with Plus! The server also allows your PC to answer your phone (if you have a modem, of course) and link its disks to a remote system through the telephone line, albeit at modem speed.

NORTON UTILITIES FOR WINDOWS 95

When you have a problem with a disk—be it an erased file or a bad sector—your dealer or consultant will likely recommend Norton Utilities. The package has grown in each of its nine previous versions since 1981, but this tenth version marks a change in direction. Conceding that many of Norton's traditional functions are built into Windows 95, Symantec Corp. (800-441-7234, 503-334-6054) refocuses on its core, endowing the $119 package ($129 on CD, which also includes three reference books) with 32-bit performance and greater automation and integration with Windows 95. Even the DOS-based programs in the package (they run in MS-DOS mode because they need exclusive access to your hardware) recognize and preserve Windows 95 features such as long filenames.

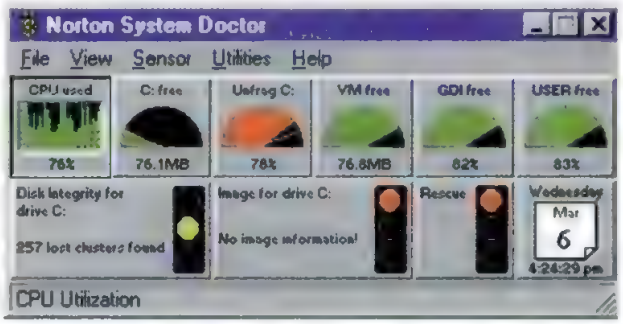
Your dealer's recommendations notwithstanding, Norton does not fix disk hardware failures or surface damage: Not much can repair a real disk disaster. The Norton Disk Doctor does, however, fix problems with the data recorded on disk, including lost clusters, cross-linked files, and damaged allocation tables. Although Windows 95 handles these functions too, Norton often takes an extra step; for example, it traces the full length of cross-linked files rather than truncating them. In addition, Norton lets you make an "undo" disk, so even if your efforts go awry, you won't ever be worse off than when you started. Like Windows 95's ScanDisk, Norton makes surface tests, but it repeats the process multiple times.

Speed Disk, Norton's disk defragmenter, improves on Windows 95's Disk Defragmenter primarily by offering more options. You can reorder your folders (directories) and put them at the beginning of your disk, arrange files by creation date and last access, or even specify which files to put where. Norton will also optionally defragment your swap file—something Windows 95 won't even attempt.

Although the use of 32-bit code should give Norton an innate edge over the 16-bit defrag code in Windows 95, you can't directly compare performance because Norton offers many more options than found in Windows 95. Norton's file-only defrag finishes in a fraction of the time of Windows 95, but a thorough job with reordering takes substantially longer. The only annoying aspect of Speed Disk (and Norton in general) is its incomplete integration with the rest of the package. On encountering a disk error, Speed Disk dumps you into Norton Disk Doctor and then leaves the scene instead of resuming the job.

Norton Recycling Bin adds a further layer of protection to Windows 95's recycling bin. When you install Norton Protect, the files you empty from the recycling bin are dumped into a hidden directory where they reside as "last-resort" insurance until your system needs their space. This design sometimes causes misleading reports of disk space and odd allocation displays (such as those made by Speed Disk), because some software doesn't realize that the protected files' space automatically frees up upon demand. Further confounding the situation, Norton installed its protected recycling bin even when we told it not to, a bug that Symantec confirmed.

Better is Norton's Unerase Wizard, which recovers even those files not tossed into the recycling bin. Running the wizard basically involves a question-and-answer session, one in which the wizard knows most of the answers even if you don't. Your responses merely narrow down the wizard's list of erased files. Tell it nothing, and you can choose from every erased file on your disk. In testing, the wizard recovered every file we deleted.



Norton System Doctor gives you more information and functionality than what's offered natively under Windows 95.

Norton's Space Wizard helps you eke the last bit of capacity from your disk

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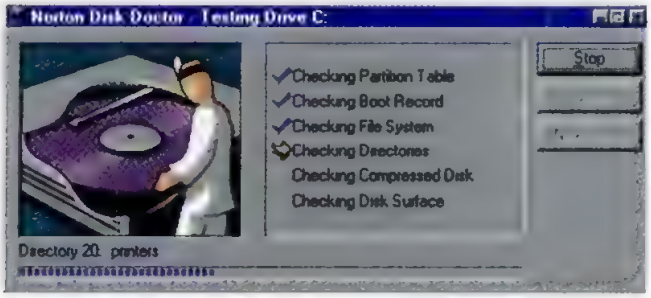


Symantec's Norton Disk Doctor checks your system's vital statistics and offers valuable feedback.

through streamlining instead of compression. It unclutters your hard disk by eliminating redundant or useless files and putting away those you rarely use. Its best (but most time-consuming) feature is its ability to find duplicate files scattered across your disk—not just files with the same name but those with identical contents based on a true byte-by-byte comparison.

Thanks to thoughtful design, the Space Wizard doesn't automatically eliminate any file but instead provides you with a convenient menu for erasing the excess baggage. Exercise your discretion, because Space Wizard doesn't know which files your applications need, and it may prompt you to eliminate a necessary file.

Norton System Doctor can overwhelm you with high-tech dials and gauges that monitor nearly every aspect of your PC's operation. Doctor acts best when you push it into the background, where it discreetly checks system parameters, such as free resources and disk space, while you are working.

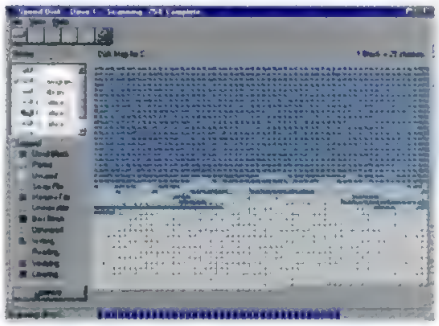
You can program Doctor to take corrective action rather than simply warn you when a problem arises. Think of it as an event-driven scheduling system compared with System Agent's time-driven system, although each does have elements of the other.

System Information, Norton's reporting system that tells you what's in your PC, organizes better, but less thoroughly, than Windows 95's own Device Manager. Its chief addition is a one-number benchmark that lets you quickly compare the performance of PCs. It tests differently from previous System Information versions (it now tests with 32-bit code), so results from new and old Norton versions don't jibe.

Disk Editor continues the tradition of the original Norton Utilities by allowing you to view or alter any byte on your hard disk, from the active data area to the partition table. Norton can also create a rescue disk that stores essential data from your hard disk (including the registry), as well as a vestigial operating system so you can boot up your system to make repairs.

You can certainly choose to use your PC without either of these basic utility packages, just as you can choose to drive a car without a spare tire. More than rectifying emergencies, however, these utilities help prevent disasters and make your PC easier and more fun to use. □

Microsoft Plus! for Windows 95. List price: $54.95. Requires: 486-based PC or better, 4MB RAM, 25MB disk space, 8-bit sound board, 256-color VGA or better, 2X CD drive, modem, Microsoft Windows 95. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329; http://www.microsoft.com. *Circle 452 on reader service card.*



Norton Speed Disk offers more options than Windows 95's display.

Norton Utilities for Windows 95. Estimated street price: $119, $59.95 upgrade, $129 CD-ROM, $69.95 CD-ROM upgrade. Requires: 486SX-based PC or better, 4MB RAM, 16MB disk space, 16-bit sound board, 256-color VGA or better, 2X-speed CD drive, Microsoft Windows 95. Symantec Corp., Cupertino, CA; 800-441-7234, 541-334-6054; fax, 541-334-7400; http://www.symantec.com. *Circle 453 on reader service card.*

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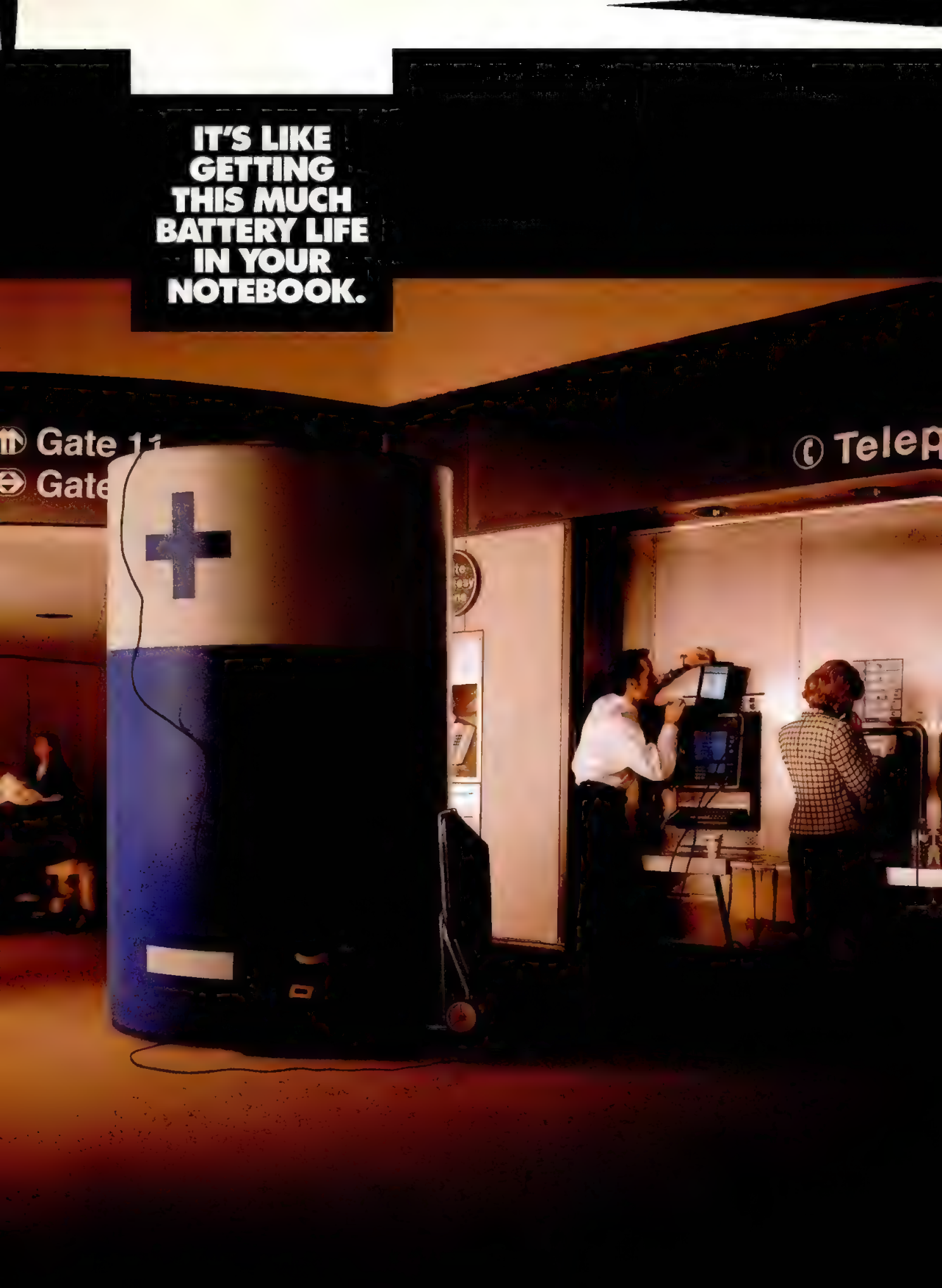
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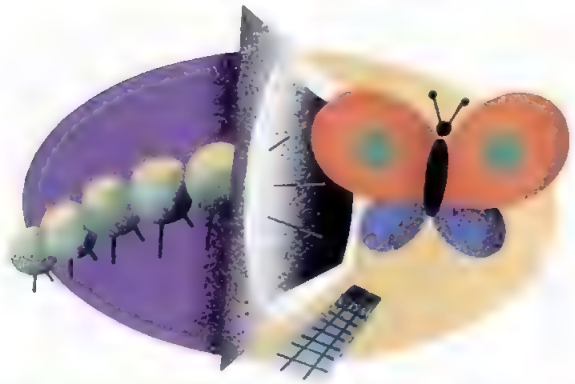


DESKTOP ENHANCERS

IF WINDOWS 95'S INTERFACE DOESN'T QUITE HIT THE MARK FOR YOU, THEN TAKE A CLOSE LOOK AT THE VARIOUS MAKEOVERS THESE DESKTOP ENHANCERS OFFER.

By Edward Mendelson

The desktop, icons, Start menu, and Taskbar that you see when you start Windows 95 were all put there by a program called Explorer. Its interface is efficient and tightly integrated, but if you don't like it you can replace it or improve it. Manufacturers have developed third-party utilities designed to supplement or enhance the Explorer interface. But you won't find total replacements for the interface, unlike during the Windows 3.*x* era, when you could entirely replace Program Manager with the Norton Desktop for Windows, PC Tools for Windows, or any of a dozen other replacements.

Enhancements to Explorer include full-featured control-panel programs like Dashboard 95 and PowerDesk; simple or elaborate launch menus and toolbars such as EasyDesktop, Lightning Power Controls 95, TabWorks, and WitchDesk; and less visible but more densely integrated enhancements including those in Norton Navigator and Microsoft's no-charge PowerToys. PowerDesk and Norton Navigator include file-manager programs that aren't as limited as Explorer's file windows, but aren't as well-integrated into Windows 95.

The only full-scale replacement for the Windows Explorer comes with Windows 95 itself, in the form of slightly improved versions of the Windows 3.*x* Program Manager and File Manager. If you want to return a modified version of the Windows 3.*x* interface, edit your SYSTEM.INI file and replace the line "shell=explorer.exe" with "shell=progman.exe" and restart Windows. You'll lose the Taskbar and the Start menu, so you'll probably prefer to keep Explorer and use one of the enhancement programs reviewed here instead.

Explorer isn't perfect. Windows 95 lacks a macro recorder that works with 32-bit applications, and its Start menu doesn't let you add commands to jump directly to one of an application's menu items. Earlier generations of desktop enhancers came with recorder and scripting utilities, icon editors, shortcut menus, keyboard maps, and other utilities that aren't in the current versions. And the older versions, when they work at all, don't fully support the new features in Windows 95. The programs reviewed here ultimately make a good beginning, but the best Windows 95 enhancements are probably yet to come.

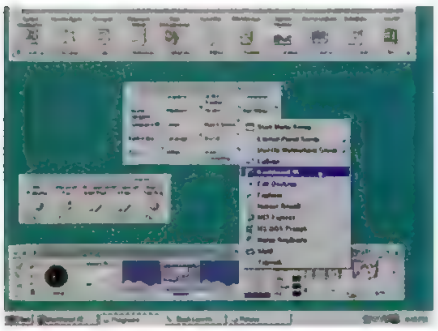
STARFISH SOFTWARE

Dashboard 95

In the old days of Windows 3.1, Dashboard's instrument-panel metaphor—with its numerous small icons for applications, printers, virtual desktops, and system gauges—helped to clarify and organize many of Windows's normally scattered and disorganized functions. In the better-organized and more graphical era of Windows 95, Starfish Software's $49.95 Dashboard 95 still provides quick access to crucial Windows features, and its valuable "layout" feature lets you load groups of applications into one or more virtual desktops with a single mouse click.

But Dashboard also adds complexity and clutter to the Windows interface, and it needlessly duplicates features provided

more effectively by Windows itself. Unlike the similar PowerDesk, Dashboard 95 doesn't include file management features and doesn't integrate tightly with the Windows shell. Though loyalists of earlier versions probably will want to upgrade, potential new users may think twice.



Dashboard 95 takes up considerable real estate on-screen when expanded to its full size.

Dashboard starts out as a single control panel, but you can split it into as many as five separate panels that either float on your screen or attach themselves to a screen border. The main panel displays miniature images of virtual screens, icons for accessing Windows tools like Find and Explorer, an alarm clock and calendar, system gauges, and either a poker game, slot machine, or scramble puzzle. One of its icons leads to a cleverly designed Run box that lets you run internal DOS commands—actually simulated versions of DOS commands—in a small window instead of opening a separate DOS window.

DASHING PANELS

One snap-off panel is a Taskbar that resembles the Windows 95 Taskbar except that it adds the option to float anywhere on screen and doesn't display the tray icons or the clock that Windows 95 displays on its own Taskbar. Another snap-off panel has icons for all your printers, with a green light to indicate the default printer and an optional icon that shows the current paper orientation. You can change default printers with a mouse click and drop files on a printer icon to print them. This panel one-ups Windows's own printer icons by indicating the current default printer at a glance.

A third panel displays a button that matches each of your Start menu groups, and lets you create custom groups. The first time you click on any of these buttons during a session, you'll wait a few seconds for Dashboard to read the menu entries. Then it pops up a list of menu items, along with an item at the top that opens the menu in the form of an Explorer group window. But when you click on a submenu item, the upper-level menu disappears, which can make navigation difficult.

The fourth snap-off panel is a tabbed toolbar in which your applications are organized automatically by Dashboard in categories like multimedia, publishing, and others. You can customize these categories, but this tabbed toolbar essentially provides another way to access the following: the same items accessible from the panel, based on your Start menu groups (with the addition of tabs for your desktop icons); recently-used documents; and multiple-application "layouts."

Resizing Dashboard's panels may frustrate you. When you expand one panel, another one often shrinks, even though the screen has enough room. And when you attempt to restore the shrunken panel, another panel may change its size in the process.

Dashboard holds promise as an extensible system, and Starfish Software is readying a version called Internet Dashboard that will organize Internet addresses. But as a vehicle for organizing Windows 95 itself, Dashboard comes across as weighed down by too much luggage from earlier versions.—*Edward Mendelson*

Dashboard 95. Estimated street price: $49.95. Requires: 486 CPU, 4MB RAM, 5MB hard disk space, Microsoft Windows 95. Starfish Software, Scotts Valley, CA; 800-765-7839, 408-461-5800; fax, 408-461-5900; http://www.starfishsoftware.com. *Circle 443 on reader service card.*

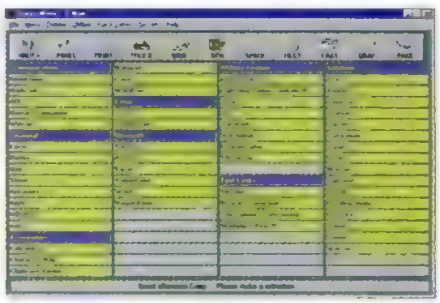
MICROSECONDS INTERNATIONAL INC.

EasyDesktop

An icon may well be worth about 1,024 words, but too many little bitmaps can drive a Windows user to despair. This appears to be the philosophy behind MicroSeconds' EasyDesktop, a shell utility for folks who like to read before they launch. The $59.95 EasyDesktop 6.0 implants a ten-page *text-based* menu in the center of your screen, where you can launch up to 76 items per page.

To help you find your way, EasyDesktop lets you name the pages and select them from a drop-down menu. The program remembers which page you were most recently working on, so you can easily set up particular pages for specific projects or users. Anything to which you assign a Windows 95 shortcut can become an EasyDesktop menu entry. (If you launch a folder from a menu item, however, EasyDesktop will open it in a simple folder window, even if you have changed your registry to make Explore the default action for folders.)

The EasyDesktop window itself occupies more than 90 percent of your screen. It adjusts its size automatically if you switch from standard VGA (640 by 480) to 800 by 600 pixel resolution. You can switch to the EasyDesktop window directly from any application by pressing the Pause key, and a second press of the key sends the program window to the back and returns you to your application. The physical dimensions of this utility, however, may bother some users who like the leaner profile of icon-based tools such as PowerDesk and Dashboard 95.



EasyDesktop 6.0 lets you build ten pages of text-based menus.

EASY COME, EASY GO

In EasyDesktop, you can: customize launch items with the standard Windows 95 shortcut properties, such as command-line parameter, startup directory, keyboard shortcut, initial window state, and some unusual extras; assign a .WAV or .AVI file to an item that lets you see or hear instructions upon opening a program or document; and deliver particular keystrokes to a document or application upon launch with the help of a somewhat clumsy macro dialog box.

To help you set up your first menu, EasyDesktop volunteers to convert any item on any node of your Start menu. You may also drag and drop objects from your desktop or folders to new menu slots. But

Norton Navigator

When Microsoft shipped Windows 95 last year, most users considered the new interface a vast improvement over Windows 3.1's Program Manager. On the other hand, the Windows Explorer has its detractors, and even the most loyal Windows 95 users are aware of the desktop's limitations. Products like our Editors' Choice desktop enhancer, Symantec Corp.'s Norton Navigator, help erase many of those problems.

Along with virtual desktops and Taskbar icons for launching applications, Norton Navigator adds a level of convenience that's lacking under vanilla Windows 95. Its File Manager offers direct access to FTP sites (they appear as directories) and the ability to view zipped files as if they were simply other directories on your hard disk drive. These features alone beat the Windows Explorer file manager by a mile.

Norton Navigator also reaches off the desktop and into your applications: For example, it adds a list of most recently used files to your file dialog boxes.

We do recommend, however, that you think about whether or not you want to install *everything* Navigator offers—it can slow your system down.

Two other products deserve mentioning. MicroHelp's affordable PowerDesk features a handy toolbar wizard and a drag-and-drop property sheet. Though PowerDesk isn't quite as feature-rich as Navigator, its exceptional Explorer replacement, Explorer Plus, adds useful features such as .ZIP compression services. Likewise, Microsoft's Windows 95 PowerToys, though not as full-featured as Navigator, does give you a lot for little: Downloadable from the Web, PowerToys features the handy TweakUI, an applet that serves as your passport to controls that normally entail complicated tweaking with the Registry.

PC MAGAZINE EDITORS' CHOICE

once items appear on the menu, rearranging them proved difficult; in most cases, you must invoke a special drag modality.

STRAIGHT FROM THE DESKTOP

Besides the menus, EasyDesktop provides numerous aids for file management and system maintenance: For example, the utility provides direct access to individual Control Panel applets and lets you change the default printer or print orientation with a simple menu pick. Other commands take you straight to ScanDisk, DriveSpace, the defragger, the Windows Backup program, Microsoft's system and performance monitors, and the Recycle Bin.

Meanwhile, newly added context-menu commands simplify file relocation, allow you to split files across multiple floppy disks, and provide .ZIP compression and expansion services. In addition to all this, EasyDesktop has its own alternative calculator, a CD player, a font sampler, a special-character inserter, an alarm feature with room for 15 timed alarms, a system information table, and five games.

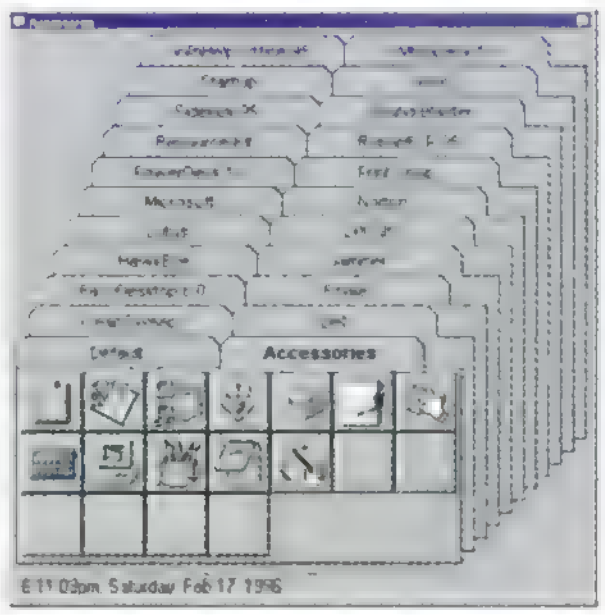
EasyDesktop offers a wealth of good stuff. Even if you basically feel at home with the Start menu, you may find the other goodies and the simplified access to Windows 95's services worth the admission price. In particular, if you're looking to get away from Windows 95's iconic world, EasyDesktop may be the desktop enhancer for you.—*Craig Stinson*

EasyDesktop 6.0. List price: $59.95. Requires: 386-based PC or better, 8MB RAM, 5MB hard disk space, Microsoft Windows 95. MicroSeconds International Inc., Rancho Santa Fe, CA; 800-889-3279, 619-756-0765; fax, 619-756-0855; http://members.gnn.com/microsec/online.htm. *Circle 446 on reader service card.*

LUCID CORP.

Lightning Power Controls 95

Lucid bills its $49.95 Lightning Power Controls 95 as a utility for the power hungry. The program allows you to set up icons for launching programs, opening documents, switching between virtual desktops, monitoring system resources, displaying system information, sending commands and keystrokes to applications, and shutting down Windows. Unfortunately, a considerable amount of complexity comes with these features.



In Lightning Power Controls 95, you can navigate with custom button bars.

Lightning Power Controls—which ships only on CD-ROM and operates under Windows 3.1 as well as Windows 95—is hobbled by obtuse terminology, a Byzantine command structure, and sparse documentation. Once you've found your way, however, you'll be able to create tabbed dialog boxes in which each tab displays a set of functionally related icons. To help you remember what the icons stand for, you can assign a help string to each. Your string either pops up beside the button when you rest your mouse or appears in a status bar at the bottom of the window.

LIGHTNING STRATEGIES

The entire windowful of icons stays on top by default, but you can make it coverable if you prefer. A right-click on the window's title bar rolls the window up so all you see is the bar; a second right-click there rolls the window back down. You can press Esc to minimize the window or press Break to restore the window and transfer the focus to it. These unusual mouse and keyboard procedures keep Lightning Power Controls from cluttering your screen and mitigate the program's inadequacies: You can't dock the window, set an "auto hide" mode, or merge the window's icons with your Windows 95 Taskbar.

As an alternative to the Start menu,

Lightning Power Controls supplies a command to build (and rebuild as necessary) launch icons from your Program Manager groups (that is, from the Program's submenu of your Start menu). Thus, you can easily transform your Accessories menu into one set of icons, your Startup menu into another, and so on. But, like the comparable feature in TabWorks, this command ignores any items below the top level of your Programs menu.

Lightning Power Controls provides a few capabilities that you won't find in the standard Windows 95 user interface, such as a toolbar in Notepad. Once you've assigned an entire tab of your button-bar window to a particular application, then Lightning Power Controls makes every item in that application's menu tree assignable to nearly any button in the window. The resulting toolbar won't live within Notepad, but you'll be able to use it as though it did. You can also make these buttons deliver keystrokes to applications. But you can't apply the resulting uneditable macros to more than one application at a time, and they don't support mouse actions.

The application's resource monitor includes a convenient "snapshot" service that lets you measure the incremental impact of an application on your GDI and User heaps. And a Clipboard recall feature provides a crude form of scrapbook capability to let you repaste items long gone from the system Clipboard.

On the short side, Lightning Power Controls lacks file-management tools and does nothing to simplify your use of the various Windows 95 system-management tools. It supports long filenames and universal naming convention (UNC) paths, but it won't help you change printers, install drivers, defrag your disk, open a recent document, or troubleshoot a resource conflict. And with Program Manager out of the picture, simply duplicating sections of your Start menu on a set of button bars seems like a lot of work for minimal gain.—*CS*

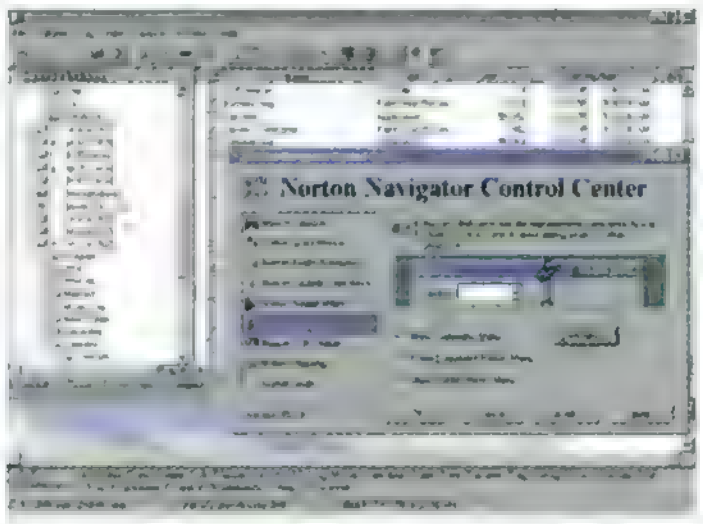
Lightning Power Controls 95. Estimated street price: $49.95. Requires: 386-based PC or better, 4MB RAM, 4MB hard disk space, 2X CD-ROM drive, Microsoft Windows 3.1 or later. Lucid Corp., Richardson, TX; 800-925-8243, 214-994-8100; fax, 214-994-8103; http://www.lucidcorp.com. *Circle 451 on reader service card.*

SYMANTEC CORP.

Norton Navigator

Symantec Corp.'s Norton Navigator ($99.95) can take over your Windows environment, adding virtual desktops and Taskbar icons for launching applications, or it can work almost invisibly, adding convenience and efficiency throughout your Windows environment. Either way, it's the most effective Windows enhancement on the market.

In its latest incarnation, Norton Navigator now includes long file name support to 16-bit dialog boxes, drop-down lists of file-management commands, lists of most recently used (MRU) files, directories to



The background shows the Norton File Manager. The control center is in the foreground.

File/Open and File/Save dialog boxes, and an elaborate Undo feature for all Windows file operations. Keep in mind, though, that you may not want to install all that Navigator offers, as it may slow your system down a bit.

The most ingenious and original parts of Norton Navigator are the least visible. The MRU lists, available from tiny icons in file dialog boxes, can save you thousands of keystrokes, and the latest version of the program adds these dialogs both to standard Windows dialog boxes and to the dialog boxes found in Microsoft Office applications. You can decide which commands to add to the optional list of file management commands that drops down from a similar tiny icon. Symantec has added long file name support so unobtrusively that only the letters "LFN" in 16-bit dialogs indicate its presence.

Symantec also added commands to the pop-up context menus of Windows Explorer so you can zip, unzip, move, or copy files using well-designed dialog boxes. These commands don't include keyboard shortcuts; you have to choose them with the mouse or use the arrow keys to navigate the context menu, unlike the commands in PowerDesk.

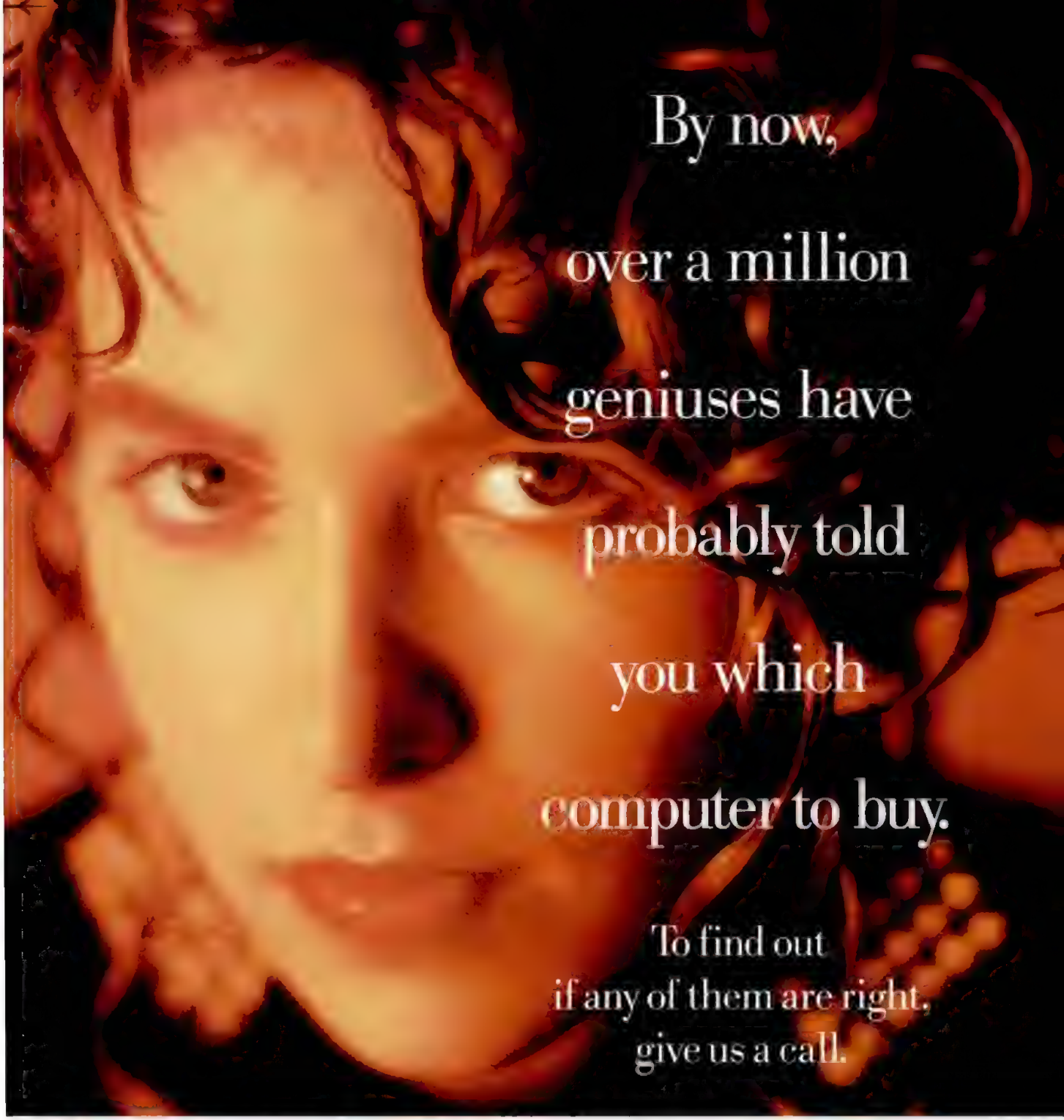
The more visible features include a special area of the Windows Taskbar, where you can drag icons of applications or files that you want to access quickly without going to the Start menu or desktop. The same region includes miniature images of any virtual windows you create, if you want to keep separate applications or groups of applications on separate desktops.

The Norton File Manager looks and acts more like the Windows 3.*x* file manager than the Windows 95 Explorer, except for the optional pane that displays files using the Quick View viewers, which come with Windows, or the add-on viewers of Quick View Plus. Norton File Manager treats .ZIP files as directories, and you can view a file compressed in a .ZIP archive simply by moving the highlight to it in the file-list pane. Diehard users of XTree for DOS can use its fast one-keystroke shortcuts. And an innovative list of dozens of useful FTP sites appears below the list of local drives and network drives.

The file manager also includes a very convenient tab that displays deleted files and your chances of recovering them, as well as an elaborate file searcher that optionally uses indexes created in the background. You can also search more specifically than you can in Windows's own file finder. In addition, a "smart folder" feature creates desktop folders with shortcuts to files that fit the name and date specifications that you choose. These folders conveniently update themselves in the background so that their lists of shortcuts always remain up-to-date.

You may not need all the more visible features of the Norton Navigator, but no one who has used the program's less visible features will ever want to run Windows 95 without them. If you want to extend your Windows system, look no further than Norton Navigator.—*EM*

Norton Navigator. Estimated street price: $99.95. Requires:, 486-based PC or better, 8MB RAM, 8MB hard disk space, Microsoft Windows 95. Symantec Corp., Cupertino CA; 800-441-7234; 541-334-6054; fax, 541-334-7400; http://www.symantec.com. *Circle 453 on reader service card.*



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Desktop Enhancers

■ YES · NO

Products listed in alphabetical order	Dashboard 95	Easy-Desktop 6.0	Lightning Power Controls 95	Norton Navigator	PowerDesk 1.0	PowerToys	TabWorks 2.0	WitchDesk 1.0
Displays virtual desktops	■		■	■	■			
Keyboard-only access to all features	■	■					■	
Enhances context menu		■		■	■	■		
Custom menus	■	■	■	■				
Supports multiple toolbars	■		■		■		■	
Adds long-filename support to Windows 3.1 applications				■				
Integrated .ZIP file support		■		■	■			
Contains macro recorder		■	■					■

MICROHELP

PowerDesk

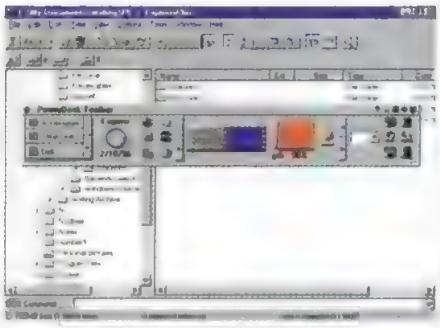
The $49.95 PowerDesk 1.0 from MicroHelp is really two distinct utilities rolled into a single package: a customizable tool bar, comparable to Dashboard 95, and an enhanced alternative to Windows Explorer, comparable to the file manager shipped with Norton Navigator.

Unlike several of its competitors, MicroHelp developed PowerDesk specifically for Windows 95. Accordingly, it not only supports long filenames, UNC paths, and drag and drop customization, but it also provides direct access to some of the more distant reaches of the Windows 95 shell.

POWER PLAYS

PowerDesk's tool bar avoids screen clutter by offering an auto-hide mode, as well as options to merge its tools with the standard Windows task bar or to simply let the tool bar float. In auto-hide mode, you dock against any screen edge, but PowerDesk makes the bar invisible until you point to it. When the tool bar is merged with the task bar, you can only access certain PowerDesk features. Because the system allows multiple tool bars, you can keep some items on the task bar and others in a docked or floating bar. Whatever mode you choose, you can summon and dismiss the tool bar with a keyboard shortcut, but you can't Alt-Tab like you can in EasyDesktop, Lightning Power Controls, and WitchDesk.

A wizard assists you in setting up your tool bars, and an intelligently designed property sheet lets you use drag-and-drop techniques to rearrange the furniture. A toolbar can have any or all of eight elements: a set of menus that recreate selected sections of your Programs menu; a section of icons that mimic ordinary desktop shortcuts; one or more clocks, which may be set to any time zone; a section for managing up to 16 virtual desktops; a section for monitoring system resources, open threads, CPU usage, and free disk space; a set of drag-and-drop printing targets; a DOS command line, with history; and a set of icons for shutting down and restarting, switching to DOS mode, logging on as a different user, and changing the display resolution (but not the color depth).



PowerDesk's toolbar provides quick access to programs, printers, and system functions.

ONE STEP AHEAD

You can customize your keyboard shortcuts and add "sticky apps" to your virtual desktops. (Sticky apps are programs that you designate to appear on all virtual desktops). Resource monitors can sound alarms at specified thresholds, and the PowerDesk command line smartly accepts certain internal DOS commands, such as DIR, that the Windows 95's own Run command rejects. However, the tool bar doesn't support the Start menu's recent-document list. MicroHelp says version 1.1, which should be ready by the time you read this, will remedy this, as well as add access to Control Panel applets.

Among other things, ExplorerPlus, the PowerDesk file manager, provides .ZIP compression services, an optional viewer pane (which includes a hex-dump feature), a customizable tool bar, and a drive bar comparable to the one in the Windows 3.1 File Manager. A check box, well hidden in this program's Options menu, lets you send (delete) files to the Recycle Bin from the DOS command line, and additions to the context menu for files and folders let you copy and move with the help of a target browser. Other commands in ExplorerPlus allow Recycle Bin maintenance and access to the Windows Find utility as well as to the Add/Remove Programs applet. But access to ScanDisk, DriveSpace, the defragger, and Backup is missing from PowerDesk.

PowerDesk is an unobtrusive, unpretentious, useful set of tools. You will likely get your $49.95's worth from either the toolbar or ExplorerPlus, and the combination amounts to genuine value.—*CS*

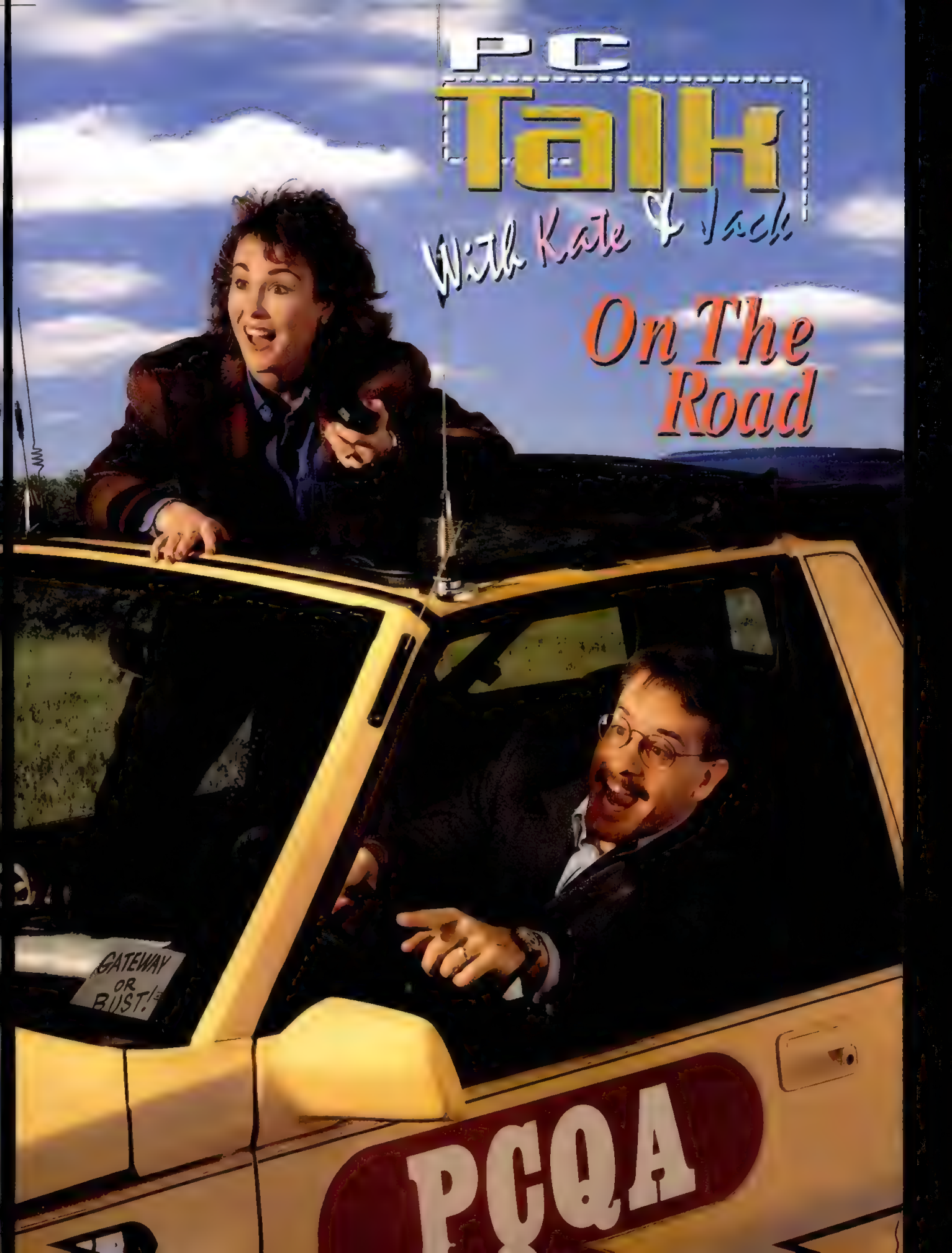
PowerDesk 1.0. Estimated street price: $49.95. Requires: 486-based PC or better, 8MB RAM, 2MB hard disk space, Microsoft Windows 95. MicroHelp, Marietta, GA; 800-777-3322, 770-516-0899; fax, 770-516-1099; http://www.microhelp.com. *Circle 455 on reader service card.*

MICROSOFT CORP.

PowerToys

Microsoft Corp.'s PowerToys make Windows 95 more convenient, customizable, and powerful than you ever imagined—and won't cost you anything except for the connect time to download them from the company's Web site.

The programmers who worked on Windows itself wrote PowerToys, so you


PC
Talk
With Kate & Jack
On The Road
GATEWAY OR BUST!
PCQA

PC
Talk
With Katie & Jack
Jack
PCQA
PCQA

Kate: Good morning and mega power from South Dakota! This is "PC Talk with Kate and Jack — On the Road" broadcasting live from Gateway 2000® headquarters in North Sioux City, South Dakota.

[redacted] When we heard Gateway had developed a whole new computer category for the entire family, we decided to jump in the PCQA mobile and check it out for ourselves. All this fresh Midwestern air has us perkier than a double espresso. Aren't you glad I scored that invite from Ted?

Kate: Yeah, yeah, whatever. You see, Jack is convinced that he's the reason we're here. Because after Gateway 2000 Chairman and CEO Ted Waitt called our show one day, Jack kept him on the line — schmoozing and hinting around that we wanted to come up and see Gateway. We were flabbergasted when we got an e-mail later that day with Ted's personal invitation for us to visit.

[redacted] And man, are we impressed! When we pulled up to Gateway's cow-spotted mega building bright and early this morning, even Kate was speechless. We were basking in the golden glow of the South Dakota sunrise when we were greeted by a friendly woman named Jessica. She's a sales rep who came in early to get a jump on her paperwork, but she graciously agreed to give us a tour.

Destination® Big Screen PC features a fast Pentium® processor, cable-ready TV tuner, Destination31 monitor (31" viewable), wireless keyboard & Field Mouse™ remote, & Destination Software Collection starting at $3,499.

Kate: **We were literally in awe as we watched thousands of energetic, excited employees begin their day.**

[redacted] Tell them about the coolest thing we saw!

Kate: Be patient — I'm getting to it. Amidst the hustle and bustle, we couldn't help but hear this incredible booming stereo sound. It sounded like a movie theater, and it was coming from a dark secluded area. Jessica let us check it out, and lo and behold, there was one of those honkin' Destination31 monitors (31-inch viewable) — just like the one delivered to the station the day we talked to Ted.

[redacted] **Yeah, but this was more than just the monitor, it was the whole Destination Big Screen PC including the fabulous wireless keyboard and Field Mouse™ remote!** The Gateway crew had put it in an entertainment center and built a family room setting in their test lab. When we got there, at least a dozen people were lounging on the sofa and playing the sports car game *The Need For Speed*™.

Kate: Jeff from Jersey City is dying to get through on the phone. Fire away, Jeff!

Jeff: *You've seen the Destination Big Screen PC? I've been wild to get one for my family ever since I heard Gateway was coming out with it.*

Kate: Now's your chance, Jeff. **The Destination Big Screen PC has blown the PC market open with a totally new category of computer. Gateway's Destination Big Screen PC is the result of the convergence of the PC and the TV — it will revolutionize computer use in the home. The Destination system is designed for the family room, and it is perfect for anyone who wants to share their computing experience with others — even if it's just one other person.** And it really made some cool sounds when Jack crashed into the wall with his cyber sports car!

[redacted] I had just got 'er over 160 mph when a computer-controlled car in back of me took me out. The end-over-end rumble was intense. Mary from Miami, you're on!

Mary: *What's the deal with the "wireless devices?"*

Kate: **They function exactly like your standard keyboard and mouse but without the wires. That means you can use them while lounging on the couch, walking around the room or standing in back of a group of people.** Because they use radio frequency technology, these wireless devices have more range than an all-star shortstop.

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Mary: *Sounds like they are just as convenient as my TV remote.*

Kate: Even more so, Mary. **With the wireless keyboard and Field Mouse remote, you don't have to point them at the monitor like you do with a traditional remote.** Why I could even point and click through my Uncle Jake's big head!

Kate: The keyboard and mouse have all the buttons you need to control every function of your Destination® Big Screen PC. On top of that, the mouse has a button for novices and young children so they can automatically go back to the TV. And we can't forget the Destination Big Screen PC's television capabilities.

Kate: That's right. **Anything you can do with a TV, you can do with a Destination system — run cable TV to it, connect your satellite dish or VCR, even your laser disc system or game machine.** Plus the Destination Big Screen PC is designed to work specifically with your stereo system, so you'll experience the quality sound you're accustomed to receiving from your stereo.

Mary: *Can the Destination system still function as a basic computer system?*

Kate: Absolutely. **It has all the horses of a high-performance Pentium® processor with plenty of RAM and a huge hard drive. Plus it's all chained to a fast CD-ROM drive.** Happy computing!

Kate: Tom from Tampa, you're on the air!

Tom: *Mega power, Jack. I had planned to purchase a Gateway P5-166XL multimedia system in a couple of weeks. But now I'm considering the Destination Big Screen PC. What options do I have?*

Kate: **Gateway had its valued customers, like you, in mind while they were designing this new product, so they came up with the Destination Big Screen PC package. It's very simple to convert a Gateway Multimedia system into a Destination Big Screen PC.**

Tom: *What comes with the Destination Big Screen PC package?*

Kate: You get the Destination31 monitor (31-inch viewable), Destination 2MB VRAM graphics accelerator with cable-ready TV tuner, hi-fi wavetable audio card, four-channel wireless keyboard with integrated EZ Pad™ pointing device and wireless Field Mouse™ remote, and the Destination Software Collection.

Kate: Your sales rep can fill you in on the rest of the details. Thanks for the call, Tom!

Kate: We got the scoop on this hot new product, plus a ton of other stuff, when we were in the sales area this morning. The action was so intense, it sounded like the pit at the stock exchange. **Hundreds of sales reps were on the phone helping customers custom-configure systems for their individual needs.** If someone wanted a bigger hard drive on their system, bingo. The change was made, and the order was shot off to manufacturing. Hey, Mike from Memphis wants to talk about the burly power of Gateway's G6 machines.

Mike: *Sounds like Gateway is moving into the family room big time with its Destination Big Screen PC. But don't forget their workstations.* ***That Gateway G6-150 is one of the best workstation values in the industry*** *— I just ordered another one for my accounting business today.*

Kate: Wow! Tell us more!

Mike: *I need an ultra-high performance PC with Microsoft® Windows® NT™ 3.51 to squeeze every speck of performance out of 32-bit software applications like those in MS Office 95, Professional Edition.* ***The G6-150 was the perfect solution for my intensive computing needs — the price was the clincher at only $3,199.***

Kate: Amazing. Gateway has come out with a ton of cool stuff on their Solo portable PCs like the modular 4X CD-ROM drive, the EZ Pad™ pointing device and now this humongous new screen. What will they come up with next? Bert from Boston, you're on!

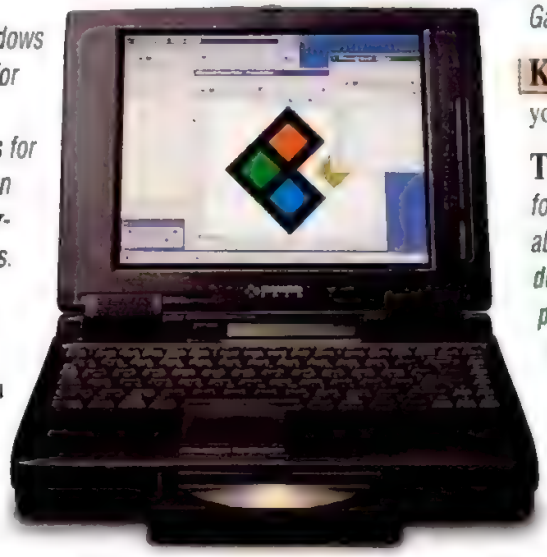
Wow, that's an intense value, Mike! I bet the accounting crew at the station is drooling at the thought of a 32-bit screamer for such an amazing price. And don't Gateway customers now have a choice of MS Windows NT 3.51 or Windows 95 on their G6 systems?

Mike: *That's right. And MS Windows NT 3.51 is available as an upgrade for only $99 on all desktop Pentium processor-based PCs, and Windows for Workgroups 3.11 is also available on Gateway's Intel® Pentium processor-based desktop and portable systems.*

You're a walking Gateway encyclopedia, Mike. You better watch out — they might recruit you for an ad. Thanks for the call!

Kate: Jack! Do you see the guy in that office over there?

What about him? He's using a Gateway Solo™ portable PC.



The Gateway Solo™ S5-120XL Best Buy portable PC features an 11.3" SVGA color display, 40MB RAM, 1.2GB hard drive, modular 4X CD-ROM drive, 28.8 PCMCIA fax/modem,16-bit sound, speakers & MS Office 95 for $5,599.

Kate: Yeah, but look at that screen. The colors are vibrant, and the screen image looks extra big. Let's check it out.

Kate: Hi, we're from PCQA radio, and we couldn't help but notice the screen on your Gateway Solo portable PC.

Greg: *Nice to meet you. I'm Greg from engineering. We've upped the ante in high-quality portable PCs by offering an even bigger screen.* ***All Gateway Solo portable PCs are now available with 11.3-inch active matrix SVGA color screens — a 17% increase in viewable screen area compared to the 10.4-inch screen.***

Bert: *Hi Kate! I'm really excited about the larger screen size on the Gateway Solo portable PC. I'm an archeologist, and I've been looking for a portable PC I can use on my expeditions. A bigger screen will help me read my maps and diagrams while I'm out in the field. I think I'll give Gateway a call right now and order a Gateway Solo PC.*

Kate: Good choice, Bert. Tory from Tulsa, you're on!

Tory: *I've had my Gateway Solo S5-75XL PC for just a couple of weeks, but I'm already nuts about it.* ***It has all the capabilities of a desktop PC in a portable package — a powerful Pentium processor, 8MB RAM, 256K pipelined burst cache, plus 16-bit sound and speakers.*** *And like all Gateway Solo portable PCs, it has a modular 4X CD-ROM drive that whips through multimedia apps in no time, and when I want to kick back, I can just drop in my favorite CD. All that for only $2,899.*

Kate: That's a hot price for a multimedia portable PC. And that 4X CD-ROM drive is a screamer — it's one of the fastest CD-ROM drives available in a portable PC. Thanks for the call, Tory!

Greg: *Hey, it was great to meet you, but I have to get to a meeting. If you guys want to see even more action, go over to manufacturing. That place is always hopping.*

Sounds good. We're heading down there right now!

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PC
Talk
With Kate & Jack
Jack
PM

Kate: Greg was right — manufacturing is really rockin.' As we speak, I'm holding the packing slip in my hand for a PC ordered by Kay from Kansas City. She's getting a P5-166XL multimedia system complete with an 8X EIDE CD-ROM drive and a 2.5GB EIDE hard drive. I didn't think this stuff was even on the market yet.

Gateway just stormed the market with a whole slew of innovative new products, in addition to the Destination® Big Screen PC. And they're offering them at an incredible value to customers out there like Kay.

Kate: Let's get a word with Stan, one of the assembly technicians putting the final touches on Kay's mean multimedia machine. So Stan, what's it like to work for the nation's leading direct marketer of PCs?

Stan: *I absolutely love it! It's great to be part of a company that cares about both its customers and its employees. Gateway 2000 has an unbelievable team spirit.* ***We have a good time, but we know that our first priority is to send only quality, high-performance PCs out the door every day.*** *We're really into quality assurance — in fact, our manufacturing facility here in North Sioux City is ISO 9002 certified.*

Kate: Keep up the great work, Stan. Hey, speaking of Kansas City, Kevin from KC is on the phone. You're on the air, Kevin!

Kevin: *Mega power, Kate! I listen to your show all the time. I'm a freelance writer, and I'm thinking about getting a Gateway PC. I could really use it to do research with applications like Microsoft® Encarta® and MS Bookshelf.® And I hear that new 8X EIDE CD-ROM has a data transfer rate of 1200Kb/second — twice as fast as the 4X CD-ROM drive.*

You'll always get the latest technology from Gateway 2000 — stuff so new that it won't be obsolete in a few months.

Kevin: *So they just build whatever I want right there at North Sioux City?*

Kate: You bet, Kevin. We've seen it with our own eyes.

Kevin: *Radical! I know some people who work at the Gateway facility here in Kansas City. They sound just like that guy Stan — always talking about the great team spirit.*

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You can't beat Gateway's great computers, built and supported by dedicated employees — you'd better give them a call today, and get your own Gateway PC!

Kate: Speaking of mega power, look who's over there by the assembly line! It's Ted Waitt.

No way. Ted's hanging out in manufacturing? I love it.

Kate: Ted! It's us — Kate and Jack from PCQA's "PC Talk."

Ted: *Sure, I talked to you guys the other day on the phone. You sure didn't waste any time heading out here.*

This is where all the hot news in the PC industry is, Ted. You'll never have to ask us twice to come visit.

Ted: *Hey, you're always welcome. You guys probably help us sell a lot of PCs.*

The P5-166XL mulitimedia PC features 16MB EDO DRAM, 2.5GB hard drive, 16-bit sound, speakers w/ subwoofer & TelePath® 28.8 fax/modem for $3,599.

So Ted, I noticed that your office is just right upstairs, do you get down to manufacturing often?

Ted: *It's my roots, Jack. I started out in manufacturing — along with sales and technical support, plus I've done a little engineering, a little advertising, a little shipping — you name it — I've done it. We all work as a team here to provide our customers with the latest technology at a great price.*

Multimedia Systems

P5-100 FAMILY PC™

- Intel® 100MHz Pentium® Processor
- 8MB EDO Performance DRAM
- 850MB 10ms EIDE Hard Drive
- 1MB DRAM, 64-Bit PCI Graphics Accelerator with MPEG Video Scaler
- 6X CD-ROM Drive/3.5" Diskette Drive
- 16-Bit Gateway Sound Card
- Altec™ Lansing ACS-40 Speakers
- TelePath® 28.8 Fax/Modem
- CrystalScan®15 .28dp Monitor (13.9" viewable)
- 7-Bay Mini Tower Case
- 104+ Keyboard & MS Mouse 2.0
- Microsoft® Windows® 95
- Generations II Software Collection

$1899

P5-120 FAMILY PC

- Intel 120MHz Pentium Processor
- 16MB EDO Performance DRAM
- 256K Pipelined Burst Cache
- 1.62GB 9ms EIDE Hard Drive
- 2MB DRAM, 64-Bit PCI Graphics Accelerator with MPEG Video Scaler
- 6X CD-ROM Drive/3.5" Diskette Drive
- 16-Bit Gateway Sound Card
- Altec Lansing ACS-40 Speakers
- TelePath 28.8 Fax/Modem
- Vivitron™15 .26dp Monitor (13.9" viewable)
- 7-Bay Mini Tower Case
- 104+ Keyboard & MS Mouse 2.0
- MS Windows 95
- Generations II Software Collection

$2349

P5-133 FAMILY PC

- Intel 133MHz Pentium Processor
- 16MB EDO Performance DRAM
- 256K Pipelined Burst Cache
- 2.5GB 10ms EIDE Hard Drive
- 2MB DRAM, 64-Bit PCI Graphics Accelerator with MPEG Video Scaler
- 8X CD-ROM Drive/3.5" Diskette Drive
- 16-Bit Gateway Sound Card
- Altec Lansing ACS-40 Speakers
- TelePath 28.8 Fax/Modem
- CrystalScan17 .28dp Monitor (15.7" viewable)
- 7-Bay Mini Tower Case
- 104+ Keyboard & MS Mouse 2.0
- MS Windows 95
- Generations II Software Collection

$2799

P5-166XL

- Intel 166MHz Pentium Processor
- 16MB EDO Performance DRAM
- 512K Pipelined Burst Cache
- 2.5GB 10ms EIDE Hard Drive
- Matrox® 2MB WRAM Graphics Accelerator w/ MPEG Video Scaler
- 8X CD-ROM Drive/3.5" Diskette Drive
- 16-Bit Ensoniq® Wavetable Sound Card
- Altec Lansing ACS-400 Speakers w/ ACS-250 Subwoofer
- TelePath 28.8 Fax/Modem
- Vivitron17 .26dp Monitor (15.9" viewable)
- 12-Bay Tower Case
- 104+ Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition*
- Generations II Software Collection

$3599

Destination® Big Screen PCs

D5-100

- Same as P5-100 Family PC System w/ Destination Big Screen PC package replacing corresponding standard components and software

$3499 *(details on next page)*

D5-120

- Same as P5-120 Family PC System w/ Destination Big Screen PC package replacing corresponding standard components and software

$3799 *(details on next page)*

D5-133

- Same as P5-133 Family PC System w/ Destination Big Screen PC package replacing corresponding standard components and software

$4199 *(details on next page)*

D5-166

- Same as P5-166XL Multimedia System w/ Destination Big Screen PC package replacing corresponding standard components and software

$4699 *(details on next page)*

Professional Systems

P5-75

- Intel 75MHz Pentium Processor
- 16MB EDO Performance DRAM
- 850MB 10ms EIDE Hard Drive
- 1MB DRAM, 64-Bit PCI Graphics Accelerator
- 6X CD-ROM Drive/3.5" Diskette Drive
- Vivitron15 .26dp Monitor (13.9" viewable)
- 7-Bay Mini Tower Case
- 104+ Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition*

$1799

P5-120

- Intel 120MHz Pentium Processor
- 16MB EDO Performance DRAM
- 256K Pipelined Burst Cache
- 1.62GB 9ms EIDE Hard Drive
- 2MB DRAM, 64-Bit PCI Graphics Accelerator
- 6X CD-ROM Drive/3.5" Diskette Drive
- Vivitron15 .26dp Monitor (13.9" viewable)
- 7-Bay Mini Tower Case
- 104+ Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition*

$2099

P5-133

- Intel 133MHz Pentium Processor
- 16MB EDO Performance DRAM
- 256K Pipelined Burst Cache
- 2.5GB 10ms EIDE Hard Drive
- 2MB DRAM, 64-Bit PCI Graphics Accelerator
- 8X CD-ROM Drive/3.5" Diskette Drive
- Vivitron15 .26dp Monitor (13.9" viewable)
- 7-Bay Mini Tower Case
- 104+ Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition*

$2349

P5-166

- Intel 166MHz Pentium Processor
- 16MB EDO Performance DRAM
- 256K Pipelined Burst Cache
- 2.5GB 10ms EIDE Hard Drive
- 2MB DRAM, 64-Bit PCI Graphics Accelerator
- 8X CD-ROM Drive/3.5" Diskette Drive
- Vivitron15 .26dp Monitor (13.9" viewable)
- 7-Bay Mini Tower Case
- 104+ Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition*

$2699

Workstations

G6-150

- Intel 150MHz Pentium Pro Processor
- 16MB DRAM
- 256K Internal Cache
- 2.5GB 10ms EIDE hard drive
- Matrox 2MB WRAM Graphics Accelerator w/ Video Scaler
- 8X CD-ROM Drive/3.5" Diskette Drive
- Vivitron15 .26dp Monitor (13.9" viewable)
- 12-Bay Tower Case
- 104+ Keyboard & MS Mouse 2.0
- MS Windows NT™ Workstation 3.51 or MS Windows 95
- MS Office 95, Professional Edition*

$3199

G6-200

- Intel 200MHz Pentium Pro Processor
- 64MB DRAM
- 256K Internal Cache
- 2GB Fast SCSI 9ms Hard Drive
- Matrox 4MB WRAM Graphics Accelerator w/ Video Scaler
- 4X SCSI CD-ROM Drive
- 3.5" Diskette Drive
- Vivitron21 Monitor (19.9" viewable)
- 12-Bay Tower Case
- 104+ Keyboard & MS Mouse 2.0
- MS Windows NT Workstation 3.51 or MS Windows 95
- MS Office 95, Professional Edition*

$6499

** MS Office 95, Professional Edition includes Word, Excel, PowerPoint® presentation graphics program, Schedule+, Access database and Bookshelf® '95.*

All systems standard with Gateway Gold™ Service & Support

Gateway 2000 Manufacturing, North Sioux City, South Dakota, is ISO 9002 certified.

ISO 9002 SGS

GSA Schedule # GS-00K-94-AGS-5150-PS01

Generations II SOFTWARE COLLECTION

■ Microsoft Encarta® 96 ■ MS Cinemania® '96 ■ MS Julia Child: Home Cooking with Master Chefs ■ MS Bob,™ For Gateway 2000 ■ MS Works 95 ■ MS Publisher 95 ■ MS Money 4.0 ■ MS Golf 2.0 ■ MS Music Central™ 96 ■ MS CD Sampler ■ MS Entertainment Packs 1-4 (31 fun games!) ■ Ca$h Graf Home Office Plus™ ■ Mayo Clinic® Family Health Book ■ Mediamatics Arcade™ MPEG Player ■ The Masters®: Interactive Journey Through Its 60-Year History, for MPEG

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Hi-Fi Extras!

Destination® Big Screen PC Package

NEW

Your family room will never be the same — the ultimate combination of television and computers has arrived! Turn a Gateway Multimedia system into the Destination Big Screen PC. The Destination Big Screen PC package specified below replaces the corresponding standard components and software of the multimedia PC you choose. All external components are charcoal colored.
(Available at time of system purchase only.)

Destination Big Screen PC Package

- Destination31 VGA monitor (31" viewable)
- Destination 2MB VRAM graphics accelerator w/ cable-ready TV tuner* featuring vertical line doubling
- 16-bit hi-fi Wavetable audio card w/ signal to noise ratio ~ 83db
- Wireless keyboard w/ integrated EZ Pad™ pointing device, wireless Field Mouse™ remote w/ integrated trackball and four-channel RF receiver
- 7-bay charcoal-colored PC rack-mount cabinet
- Speakers not included
- **Destination Software Collection**
  - Microsoft® Encarta® 96
  - Nickelodeon™ Jr. Play Math!™
  - MS Magic School Bus™: Solar System
  - The Hive™
  - You Don't Know Jack™ *(may not be suitable for children)*
  - Gateway Information Highway CD
  - Hansel & Gretel *and The Enchanted Castle*™
  - Harman Interactive SmartTV™ Programming Guide
  - 3D Atlas
  - Quicken® SE
  - 3D Monopoly™
  - The Need For Speed™
  - Launch Magazine, v. 6
  - MS Plus Pack
  - MS Cinemania® '96
  - MS Works 95

**This television receiver provides display of television closed captioning in accordance with section 15.119 of the FCC rules.*

Destination Big Screen PC Peripheral Options:

- harman/kardon High-Fidelity Sound System

Seven-piece Dolby® Prologic surround sound speaker system including AVR-10 audio/video receiver, subwoofer, center channel, and four satellites for the ultimate home stereo experience.
$699

Multimedia/Communication

- 8X EIDE CD-ROM Drive

$100 *(upgrade from systems with a 6X CD-ROM drive)*

- Altec Lansing ACS-250 Subwoofer

$75 *(upgrade from PCs that include Altec ACS-40 speakers)*

- Altec ACS-400 Speaker System w/ ACS-250 Subwoofer

$120 *(upgrade from PCs that include Altec ACS-40 speakers)*

- TelePath® 28.8 Fax/Modem

$149

Networking

3Com® Ethernet Adapters

- 16-bit Triple Media Card with BNC, AUI and RJ-45 connectors **$99**
- 16-bit Card with only RJ-45 connector **$79**

SMC® ISA Ethernet Adapters

- 16-bit Triple Media Card with BNC, AUI and RJ-45 connectors **$79**
- 16-bit Card with only RJ-45 connector **$59**

Software

- **Microsoft® Windows® 95 Upgrade**

$79 *(On diskettes $89)*

- **Kid's BackPack™ II**

Includes What is a Bellybutton?; The Tales of Peter Rabbit; Cinderella, The Original Fairy Tale; Freddi Fish™ and the Case of the Missing Kelp Seeds™; Pocahontas Reading Adventure, and a Gateway cow-spotted backpack. **$59**

- **Finance Pack**

Includes Quicken Deluxe 5, Quicken® Financial Planner,™ Quicken Family Lawyer,™ and Quicken Parents' Guide To Money.™ **$69**

- **Gateway Gamer's Pack**

Includes Command & Conquer,™ Virtual Pool™: Straight/8, The Journeyman Project 2®: Buried in Time,™ Terminal Velocity,™ Primal Rage,™ and a Gravis™ GamePad.™ **$79**

- **Flight Pack II**

Includes Comanche™ 2.0, EF 2000,™ Su-27 FLANKER,™ Flight Unlimited,™ U.S. Navy Fighters,™ and MS SideWinder™ joystick. **$99**

- **Sports Pack**

Unecessary Roughness '95,™ Hardball 4,™ FIFA International Soccer, PGA Tour® Golf, NHL® Hockey 95 , NASCAR® Racing and a Gravis GamePad. **$99**

Printers

- Epson® Stylus™ Color IIs Ink Jet Printer **$259**
- Hewlett® Packard DeskJet 600C Inkjet Printer **$259**
- Epson Stylus Color II Ink Jet Printer **$339**
- Hewlett Packard LaserJet 5L Printer **$479**
- Hewlett Packard LaserJet 5P Printer **$849**

Service & Support

Gateway Gold™ Premium

- Extended Three-Year On-Site Agreement*
- Priority 800 Number For Access To Technical Experts

$99 w/ system purchase
$129 within current on-site service agreement

**On-site service for desktop and tower systems is available to most U.S. and Canadian locations after determination by a Gateway tech that you need it. On-site service is provided by PC Technology Services Inc. Write or call for a free copy of our on-site service agreement.*

Gateway accepts most major credit cards and C.O.D. terms, with net 30-day terms and leasing options available to qualified commercial customers. You can also apply for the Gateway 2000 DuoLine™ MasterCard® card, issued by Dial National Bank, Des Moines, Iowa.

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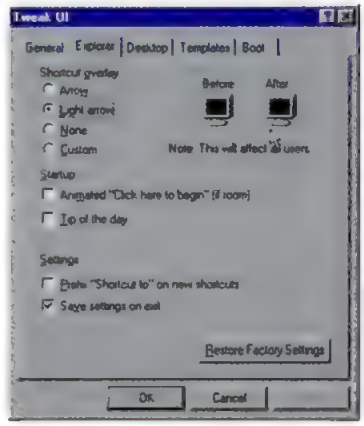
Call the Gateway 2000 special component add-ons division at 800-846-2080 for our complete line of extras for Gateway customers. Sales Hours: 7am-10pm Weekdays.

can expect to find most of them in the future versions of the operating system. (None currently come with Microsoft's Service Pak.) Some are Taskbar icons that let you perform feats like changing Windows' screen resolution and color depth without rebooting. Others add features to the context menu in Windows Explorer so you can access a list of files in a folder without opening a folder window. Another lets you print HyperText Markup Language documents directly from many applications, complete with graphics.



The TweakUI applet in PowerToys controls otherwise inaccessible features of the Windows interface.

TWEAK TIME

The most valuable of the PowerToys is a Control Panel applet called TweakUI. This gives you access to controls that otherwise require complex fiddling with the registry. It lets you: change the speed at which menus fly out of the Start Menu; turn off "exploding" windows; stop Windows from adding the words "Shortcut to" whenever you create a shortcut; and change the arrow on shortcut icons to a smaller, less obtrusive one than the default.

If you want to turn a document into a template that's listed on the New menu, just drag its filename into a panel in one of TweakUI's tabbed pages. Other settings in the applet let you hide or create desktop icons like Network Neighborhood and The Microsoft Network, while still others let you control the way Windows boots up without modifying the hidden MSDOS.SYS file by hand.

POWER TOOLS

The programs that run as Taskbar icons consists of QuickRes, which is used for changing screen dimensions and depth on the fly; AutoCD, which lets you run applications from any non-audio CD-ROM as soon as you insert the disk (even if the disk doesn't support Windows 95's AutoPlay feature); FlexiCD, a miniature audio CD control panel that can automatically resume playing a CD after you reboot; and a Telephony Location Selector that lets mobile users change their dialing location from an icon.

Additions to the Explorer context menu include the Contents command that pops up a list of files so you can launch applications or load files without opening a folder window; the Explore from Here command that opens a two-pane Explorer window with the current directory displayed as the root directory, so you don't have to sort through a full list of drives and folders; CabView, which displays the contents of Microsoft's compressed "cabinet" files (found on the Windows 95 installation disks and CD-ROM) as if they were directories and lets you drag files out of them; and Target, which lets you perform file management operations on the file to which a shortcut points without searching for the file on your disk.

Miscellaneous programs include a replacement clock program that appears as a round window with no square border. The program also automatically makes whatever window is under the mouse pointer the active window.

The PowerToy that lets you print HTML files from almost any application is a printer driver that "prints" to HTML files. It converts bitmaps to JPEG images and performs some rudimentary parsing to create standard HTML headings and tables, but you'll have to edit the resulting files to get the layout you want.

All these applets are compact, reliable, and compatible. Unless you're not running Windows 95, you'll find a use for PowerToys.—*EM*

PowerToys. List price: free. Requires: 386 CPU, 4MB RAM, 1MB hard disk space, Microsoft Windows 95. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329; http://www.microsoft.com/windows/software/powertoy.htm. *Circle 452 on reader service card.*

XSOFT (DIVISION OF XEROX)

TabWorks

Under Windows 3.1, XSoft's TabWorks offered an appealing alternative to Program Manager. Under Windows 95, TabWorks 2.0 is a utility looking for a reason to exist.

TabWorks ($49) uses a tabbed notebook as its metaphor. You can organize applications and documents into notebook pages, and a colored tab marks each page. Clicking the tabs, arrayed either vertically on the book's right side or horizontally below, takes you from page to page. You can also navigate with PgDn and PgUp or by clicking a dog-ear flap in a page's upper-right corner. TabWorks automatically adds contents and index pages, which also serve as navigational tools.

Double-clicking icons on notebook pages lets you open programs and documents. For more direct access to the items you use most, you can copy icons to a button strip that appears to the left of the notebook pages. On an 800- by 600-pixel screen, you'll have room here for almost 25 of your favorite items. Along the right edge of the window, meanwhile, TabWorks populates a "tool area" with handy drag and drop targets: the current default printer, the Recycle Bin, and icons for each local drive and mapped network server.

Items on TabWorks pages are pointers, not actual executables or documents, so you can copy them onto multiple pages without wasting storage. You can create a notebook page for each project you're currently working on, and copy whatever programs and files you need to that page. When you've completed the project, you just delete the page.

TabWorks organizes your programs and documents into notebook pages with named tabs.

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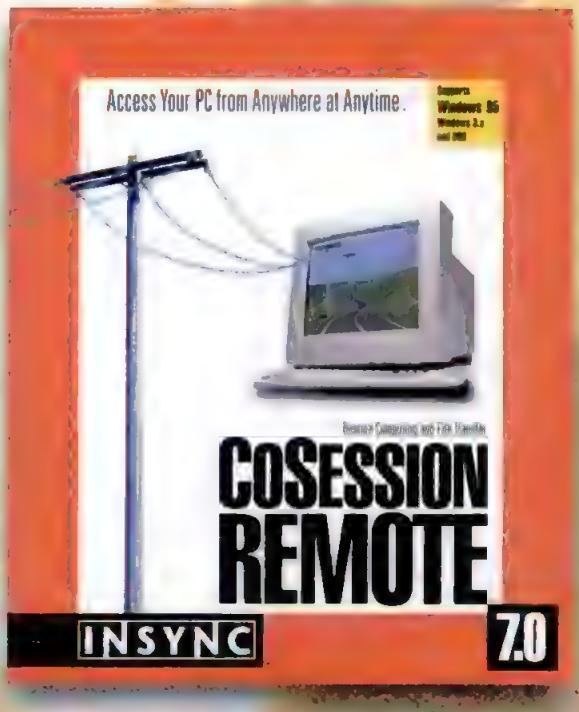

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If you think all this makes TabWorks sound like a super Program Manager, you're right. If you still use Windows 3.1, you might want to consider replacing the standard shell with TabWorks. (XSoft includes Windows 3.1 and Windows 95 versions in the same box.) But under Windows 95, TabWorks seriously disappointed us.

Other than allowing long filenames along with UNC paths and implementing the Recycle Bin as a drag target, TabWorks barely supports the new capabilities of Windows 95. The utility includes a command to convert your Programs folders to notebook pages. But this command ignores folders nested below the top level of your Programs menu. And because XSoft patterned the structure of a TabWorks notebook after the flat-file Program Manager, you can't nest pages by hand.

Dragging documents to the printer icon works fine, but if you want to change the default printer or drag to a nondefault printer, TabWorks won't help you. Nor will it do anything to streamline your access to any part of Control Panel. (Why aren't the Control Panel and Printers folders included in that tool area?) And if you use one of the utility's document-tracking features (which automatically adds newly created documents to the current notebook page), TabWorks clumsily creates a new page item for every file you *delete*, because deletions cause Windows to create new files in the Recycle Bin. XSoft is working on a fix for this.

Although items on notebook pages are shortcuts, TabWorks doesn't show the shortcut arrows on their icons, a mismatch with the standard Windows 95 UI that will irritate some users. And if you drag a shortcut from your desktop to a notebook, TabWorks may claim to move the item, but it just creates a copy. XSoft touts the new password capability as a way to protect your sensitive documents, but this feature does nothing to inhibit access via the standard Windows 95 shell. The bottom line: TabWorks solves problems that no longer need solving.—*CS*

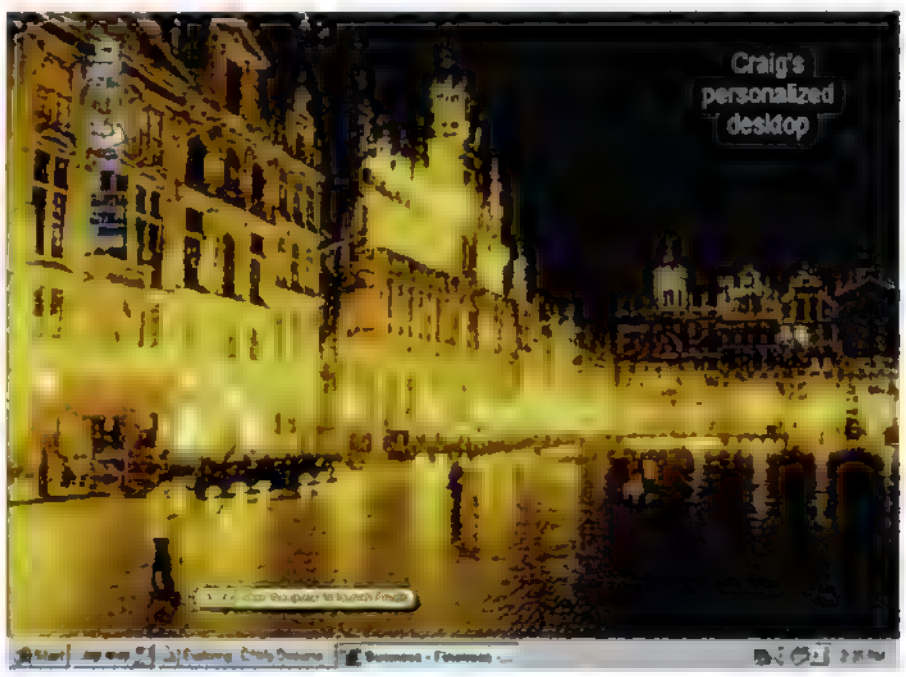
TabWorks 2.0. Estimated street price: $49. Requires: 386 PC or better, 4MB RAM, 12MB hard disk space, Microsoft Windows 3.1 or later. XSoft (a division of Xerox), Palo Alto, CA; 800-909-4446, 717-731-9811; fax, 717-730-5261; http://www.xerox.com. *Circle 458 on reader service card.*

WITCHDESK INC.

WitchDesk 1.0

Did someone delete the "personal" from your personal computer? WitchDesk thinks so, and offers WitchDesk 1.0, delivered on CD-ROM only, as the remedy. WitchDesk lets you personalize your Windows 95 user interface by draping your desktop with live wallpaper. (A separate version supports OS/2 Warp, but no version is available for Windows 3.1.) With WitchDesk in place, you double-click areas of the wallpaper to launch programs.

WitchDesk comes with more than 1,700 photographic images, including a number of attractive travel scenes, suitable for use on systems with 256 or more colors. You can make any of these a starting point for your WitchDesk UI, or you can apply any of your own full-screen images.



WitchDesk lets you personalize your user interface by covering a wallpaper scene with program-launching hot zones.

Once you've got your backdrop in place, you can use simple clicks and drags to turn it into a functioning launch pad. Four kinds of objects can serve as hot zones: smaller graphic images laid over the backdrop, text blocks, portions of the backdrop that you simply designate as hot spots, and standard Windows shortcuts (which WitchDesk, perplexingly, displays without their shortcut arrows). Using self-explanatory dialog boxes, you can add bubble help to any WitchDesk-created hotspot (other than a Windows shortcut).

WitchDesk normally fills the entire screen, save for the task bar. To drag your desktop shortcuts into the scene, or to access the desktop property sheet, you can toggle into a windowed mode. The Start menu and task bar remain visible while WitchDesk is running, allowing you to switch programs in the conventional manner and access items on your Start menu.

Hot zones on the WitchDesk scenery are not limited to opening programs and documents. They can also invoke macros (written in WitchDesk's editable scripting language or recorded with the program's supplied "wizard maker"), switch to a different WitchDesk scene, return to the scene from which the current scene was called, quit WitchDesk, or even exit from Windows. Because you can associate sound and video clips with hot zones, WitchDesk can serve as an inexpensive multimedia authoring system, suitable for self-running demos, kiosk applications, and such. The program even includes a serviceable bitmap editor.

Unfortunately, we ran into a big bug when we tested WitchDesk 1.0. On two separate computers, two of our programs invariably generated general protection faults whenever they were terminated while WitchDesk was running. In the case of one of these programs, the GPF always brought Windows itself to a halt, with potential loss of work and damage to open files. A spokesperson said WitchDesk was looking into the problem.

We also experienced problems with the macro recorder. In repeated trials, the recorder failed to play back keystrokes and mouse actions correctly. (In playback of a keyboard-only recording, for example, Ctrl-Esc inexplicably opened an item sitting on the task bar instead of invoking the Start menu.) WitchDesk said an improved version of the macro recorder should be ready by the time you read this. Lastly, in the version shipped to us, we found dialog boxes half in German, German scripting keywords, and a very crudely translated user guide. In the end WitchDesk, though innovative and promising, comes across as not quite fully baked.—*CS* □

WitchDesk 1.0. List price: $49.95. Requires: 386-based PC or better, 4MB RAM, 14MB hard disk space (22MB required for all 1,700 images), 2X CD-ROM drive, Microsoft Windows 95. WitchDesk Inc., San Jose, CA; 800-544-4756, 408-279-1885; fax, 408-271-7289; http://www.witchdesk.de. *Circle 463 on reader service card.*

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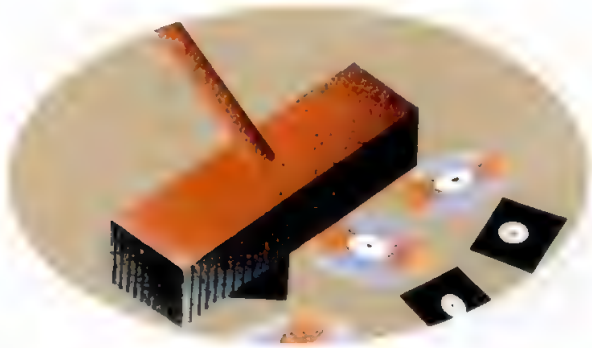


UNINSTALLERS

REMOVING APPLICATIONS BY HAND IS TEDIOUS, AND IT'S HARD TO FIND ALL THOSE DLLS. UNINSTALLERS OFFER AN ESCAPE HATCH, MAKING APPLICATION REMOVAL ALMOST SIMPLE.

By Edward Mendelson

Your hard disk is littered with files left over from programs you no longer use, or old versions of programs you've since upgraded. Uninstaller utilities are designed to clear out unwanted applications, needless entries in the Windows Registry and .INI files, and miscellaneous files that do nothing but take up space on your disk. All these utilities come with the risk that they'll remove files and Registry entries that you actually need, but they vary greatly in their levels of risk.

The original uninstaller was MicroHelp's UnInstaller, and it has now been joined by Quarterdeck's CleanSweep and Vertisoft's Remove-It. With all three, the main purpose is to remove applications by clearing out the application program itself, dynamic link library files (DLLs) and Visual Basic Extensions (VBXs) used only by the application and not shared with other Windows programs, and miscellaneous .INI files. The packages will optionally search for and destroy data files created by these programs. Each package can also archive applications and related files for later use, or help you move them between drives or computers.

The current generation of uninstallers isn't smart enough to know whether many of the DLL files in your Windows folder are essential or expendable. Some of these files are required by third-party hardware drivers and applications. CleanSweep and Remove-It both list "orphan" DLL files for possible removal (with a yellow caution light). UnInstaller 3 avoids this problem by not listing orphan DLL files unless you add an undocumented entry to the Windows Registry.

Windows 95 introduced a built-in uninstall feature, which you can find in the Control Panel's Add/Remove Software applet. The quality of this feature varies with individual software vendors, and the applet will often prompt you to remove an orphan DLL file that may in fact be required by another program. You'll generally find better results if you track an installation with the monitor programs that come with each of the application-removal utilities, and then use the utility to remove a program.

Uninstallers should be used with caution. The faster and most efficient removers are also the riskiest, and you need to find the balance between speed, thoroughness, and safety that best suits your needs.

QUARTERDECK CORP.

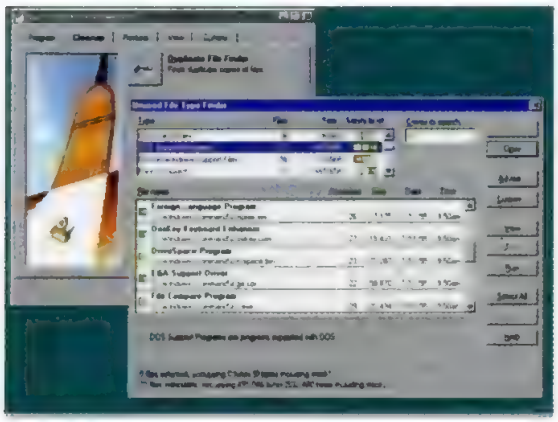
CleanSweep 95

ALL REVIEWS BY EDWARD MENDELSON

Among all application-removal software, Quarterdeck's $29.95 CleanSweep 95 is the easiest, generally the fastest, and the only one that tells you exactly what it plans to do to your system when it removes an application. Versions for Windows 3.*x* and Windows 95 come in the same package.

CleanSweep removes applications and unused orphan files; it tracks installations for accurate removal later; it compresses applications into archives for re-use at a

later time; and it moves programs between drives on your computer or to another computer. Unlike its rivals, when you perform any operation, CleanSweep gives you the option of viewing every detail of the changes it proposes to make to the fragile Windows 95 Registry and lets you decide what changes you want to accept.



CleanSweep 95 lets you view files before deleting them, and, where appropriate, lists connected files.

In standard application removals, it doesn't always list every expendable file, but it generally errs on the side of safety. In one test, it seriously damaged the Windows Registry, although Quarterdeck fixed this problem after we reported it.

When you launch CleanSweep, it rapidly scans your drive to record applications and links among them. The well-organized Uninstall dialog lets you choose among programs installed by CleanSweep's background installation monitor, or programs that the monitor didn't track, and it lets you remove either full Start menu groups or separate applications. The program then scans the selected application for links and checks its database of standard applications to find related files that it didn't detect by scanning. This database isn't as up-to-date as the ones in rival programs—it lacks the Windows 95 version of Visio—and you can't examine or change it. A Restore module easily brings back all or part of any program that you chose to back up during removal, and the program prompts you to discard old backup files after a user-selected interval.

A Cleanup dialog offers to remove duplicate files, unused DLL and VBX files, and discardable files like backups, DOS batch files, screen-savers, and other space wasters. The lists of orphaned DLLs and applications over-aggressively include files used by Windows' fax software and other parts of Microsoft Exchange, the QuickTime viewer, the Microsoft Network, and the INI file for Adobe Type Manager. The list of backup files includes anything in a directory named BACKUP, so it lists as potentially removable the backup software that Adaptec's EZ-SCSI package stores in a directory by that name. Fortunately, the program puts a yellow "caution" light next to all files in the orphans, backups, and most other lists, but you have to choose deletions explicitly.

CleanSweep gives you the option to install two background programs, one to monitor installations on the fly, the other to locate files that haven't been used recently.

On our tests with the Lotus Notes 4.0 32-bit client, the monitor reported that Notes had installed a Registry key named HKEY_LOCAL_MACHINE\Software, even though this crucial key already existed and contained all the information that Windows needs about installed software. When we used CleanSweep to remove Notes, it wiped out the entire key—a disastrous step that we fixed by restoring from CleanSweep's backup. After we reported these problems, Quarterdeck posted a patch on its Web site and shipped it to all registered users. The fixes have since been incorporated in Version 2.03.

CleanSweep's uniquely detailed reporting may make it the only acceptable application remover for expert users. And less- experienced users will find it effective and efficient if they use it with caution.

CleanSweep 95. Estimated street price: $29.95. Requires: 386-based PC or better, 4MB RAM, 5MB hard disk space, Microsoft Windows 95. Quarterdeck Corp., Marina del Rey, CA; 800-282-0866, 310-309-3700; fax, 310-309-4217; http://www.quarterdeck.com. *Circle 442 on reader service card.*

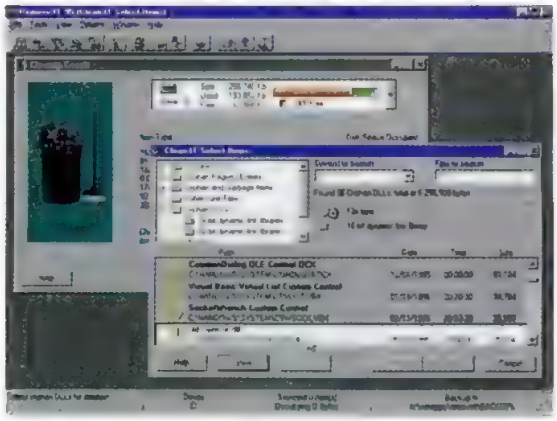
VERTISOFT SYSTEMS INC.

Remove-It 95

Vertisoft's $69.95 Remove-It 95 cleans out unused sections of the Windows 95 Registry that other application-remover programs don't even notice, and it includes a unique clean-up wizard that guides beginners and experts through the whole sometimes-complex process of removing unneeded files.

This package, which ships with both 16- and 32-bit versions, includes standard functions: It tracks installations, removes applications whether it tracked them or not, archives applications for later use, and transports programs from one computer to another—with the unique ability to install the program on the other computer even if Remove-It itself is not installed there. In ordinary application removals, Remove-It ferrets out unneeded files that other programs don't notice, but it doesn't tell you exactly what changes it proposes to make to the Windows 95 Registry.

Remove-It scans your disk quickly when you launch it, then scans the Start Menu and desktop when you launch its application-removal module. A clear series of menus walks you through the removal process, although the lack of any details about changes that the program will make to the Registry may concern users. You can choose to remove logged installations, other programs installed in Windows, or programs without Windows icons. Many of these icon-less programs are essential to Windows, and Remove-It pops up a stern warning before letting you remove them.



Remove-It's Cleanup Coach guides you through each of the program's modules.

Room for improvement

If you installed all your applications to one directory without placing any DLLs, VBXs, or OLE links anyplace else—and didn't lay a hand on your Windows 95

Registry—then these uninstallers would have an easy job at their hands. But the truth is that uninstalling is risky business. All three uninstallers have their merits and their deficits, yet none of them truly unwraps the uninstallation enigma to our satisfaction. As a result, none of them deserve our Editors' Choice. How, then, do you choose? It really depends on your tolerance for risk.

The most promising of the three apps we looked at is also the riskiest. Quarterdeck's CleanSweep 95 gives you opportunities to backup whatever you plan on removing, but its aggressiveness gives us pause. On our tests, it removed critical information from the Registry, which we eventually recovered using CleanSweep's own restore tool (Quarterdeck has since fixed this problem). On the other hand, no other uninstaller did a better job of removing unwanted applications and finding duplicate files. And its excellent reporting makes it even safer for expert users.

MicroHelp's UnInstaller 3 also deserves praise for its effectiveness, but its philosophy leans heavily toward caution, so it ultimately leaves more files hanging around than you might want. Vertisoft's Remove-It 95 is capable but not as intelligent as the other two at removing files that you might need later, such as references to OLE objects that may actually exist on removable media such as CD-ROMs.

As first-generation Windows 95 applications, all three hold promise, but none offers the kind of intelligence necessary to help you figure out what DLLs are critical, or to notice if you accidentally selected a critical file, such as a hardware driver, for removal.

PC MAGAZINE EDITORS' CHOICE

Remove-It scans applications you want to discard, and checks its large database of standard applications for related files that it can't find by scanning. Expert users can examine this database with a file viewer, but can't customize it.

An INI file editor lets you remove or modify entries, but not add new ones. The cleanup module does an impressive job of finding unused Registry data, but don't believe every green light that the program places next to items that it considers safe to remove. Remove-It tells you that you can safely remove references to OLE objects that it can't find—but it can't find them because they exist on multimedia CD-ROM disks that aren't in the drive when Remove-It is looking. Vertisoft fixed this after we reported it, and a patch file is available on Vertisoft's CompuServe and America Online forums.

Vertisoft also vowed to fix other problems we detected, including its inclusion of many commonly-used DLLs in the list of orphans. On our test system, this list included the Visual Basic 4.0 run-time files required by many applications on our system, the DLLs used by Hewlett-Packard's ScanJet software, Apple's QuickTime movie player, parts of Microsoft Office, and all the backup software that Adaptec's EZ-SCSI stores in a BACKUP file. After we alerted Verisoft of these specific DLL problems, the company released a fix which leaves out these DLLs.

Remove-It's installation monitor is slower than CleanSweep's because it stores a list of all your files and all your Registry entries before and after an installation, and it compares them in order to produce its report. This method is safe but frustratingly slow, and the monitor's reports, which are buried deep in the reporting module of the main program, do not include any details about recorded changes to the Registry or .INI files. Vertisoft should have fixed this by the time you read this. You can start the monitor at any time to record changes to your system. A second monitor program keeps track of files and applications that are rarely used, and comes in handy only if you know that you won't need older files.

Remove-It boasts the widest range of features of any application-remover. Expert users will prefer the more detailed reporting in CleanSweep 95, but other users will find it an effective way to remove old applications if they treat its lists of removable files with extreme caution.

Remove-It 95. List price: $69.95. Requires: 386DX-based PC or better, 4MB RAM, 4MB hard disk space, Microsoft Windows 95. Vertisoft Systems Inc., San Francisco, CA; 800-466-5875; 864-295-5875; fax, 800-466-4719; http://www.vertisoftsys.com. *Circle 457 on reader service card.*

MICROHELP

UnInstaller 3

In its third version, MicroHelp's $39.95 UnInstaller has implemented lessons learned that rival packages have hardly heard about. The least aggressive program of its kind, trusty UnInstaller 3 makes damaging your system while trying to regain disk space very difficult.

UnInstaller deliberately avoids the more risky feats attempted by other packages so that you'll spend less time undoing inadvertent damage. It reliably removes and archives applications, and it lets you move them to another drive or to another computer that also has a copy of UnInstaller.

UnInstaller also helps you remove files that Win-

Uninstallers

■ YES ■ NO

Products listed in alphabetical order	CleanSweep 95	Remove-It 95	UnInstaller 3
Background installation tracking	■	■	■
Installation tracking on command	■	■	■
Backs up when removing files	■	■	■
Moves applications between drives	■	■	■
Moves applications between PCs	■	■	■
Creates self-installing files	■	■	■
Finds duplicate files	■	■	■
Fully edits .INI files	■	■	■
Prompts to remove backup files	■	■	■

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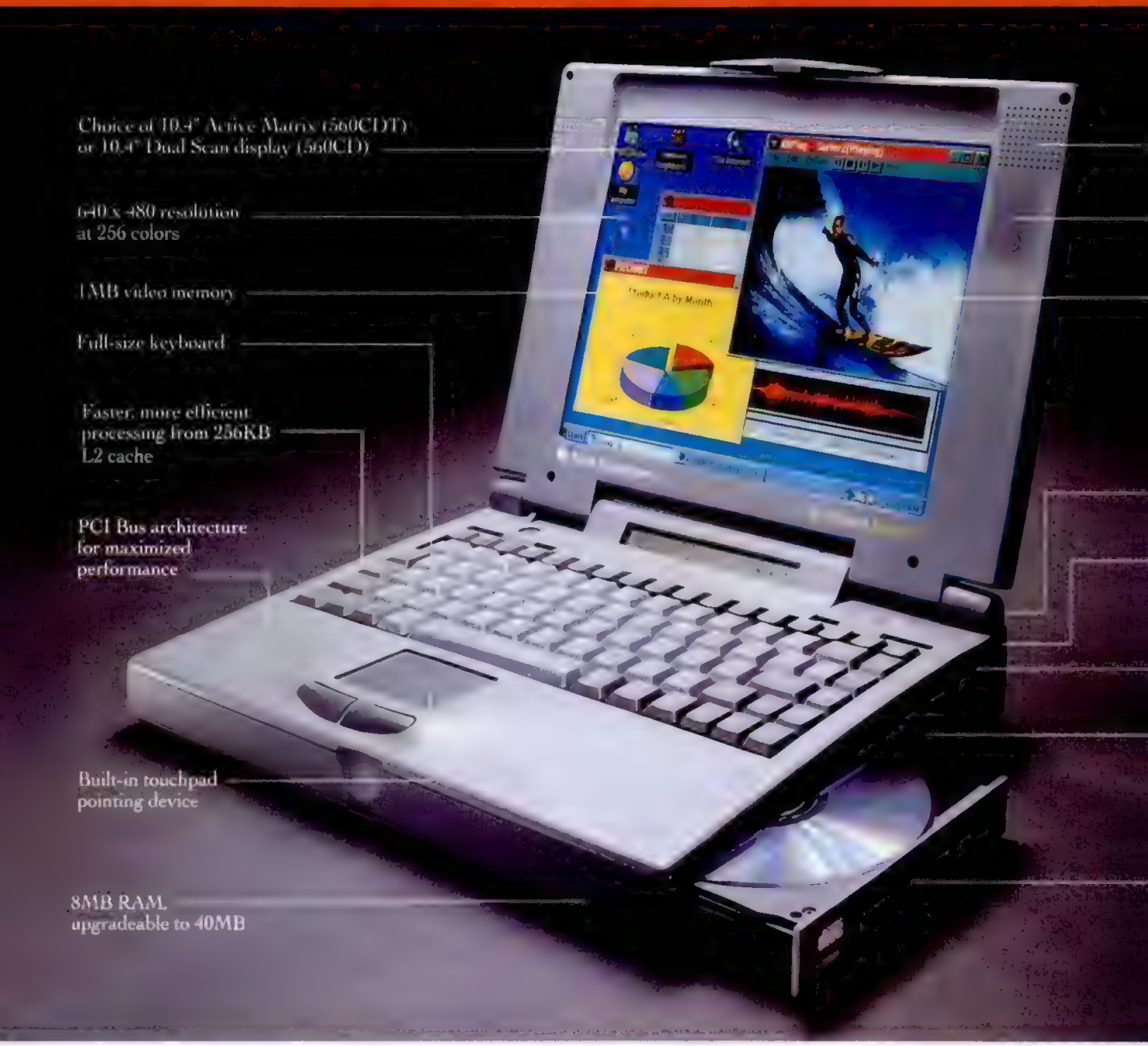

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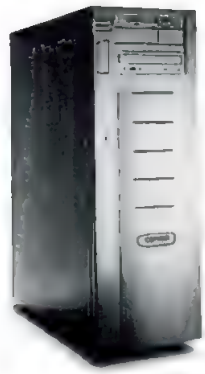

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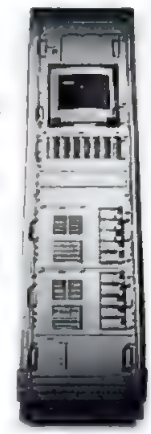

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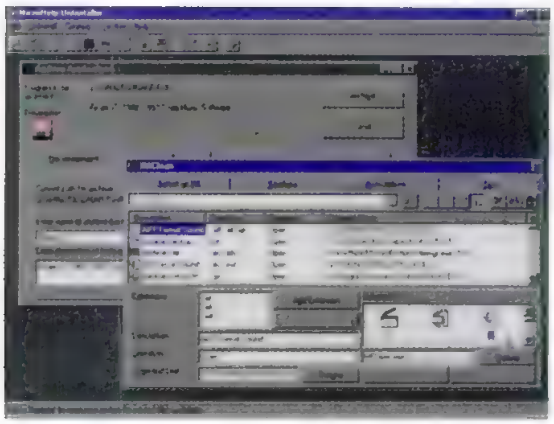

UnInstaller 3 lets you edit file associations and INI files in one window while removing applications in another.

dows unquestionably doesn't need—such as help files, fonts, multimedia files, and duplicate files—and it lets you confirm that you're removing only a true duplicate, not simply a file with the same name and size as another. It lists orphan applications, but instead of giving you the dangerous option of deleting them, it offers to reinstall them into the Start Menu.

PLAYIN' IT SAFE

When you start UnInstaller, it presents you with a mostly blank window, and you select one of the program's modules from the top-line menu or a toolbar. The first time you want to delete, move, or archive an application, UnInstaller prompts you to let it build or update its SmartLinks database of applications and linked files. Although this scanning operation takes more time than the startup scans of rival utilities, it deliberately produces less complete results. For example, in a test removal of parts of Spry Internet Office, both Remove-It and CleanSweep listed an .INI file that UnInstaller didn't list, although the program could have safely removed the file.

With UnInstaller, you can remove only one application at a time—a limitation that will inconvenience some users and rescue others from unintended disasters. The program doesn't describe in detail the changes it plans to make in the Registry, and advanced users may hesitate to accept these changes on faith. MicroHelp promises improved reporting in a future version.

A SHORTER LIST

UnInstaller's cleanup module lists discardable mulitimedia files, help files, and other categories that can safely be removed, and unlike both Remove-It and CleanSweep, it won't list backup software among your removable backup files. The list of orphan files lists only executable files, not DLLs, and if you want to remove any of the orphans you find, you have to go to Windows Explorer or the DOS command line and do it yourself. Earlier versions of UnInstaller pioneered the orphan-removal feature, but MicroHelp removed it after too many users removed essential files. If you want to bring back the orphan-removal function and add DLLs to the list of orphans displayed, make this undocumented change to the Windows Registry. Under HKEY_CURRENT_USER\Software\MicroHelp\UnInstaller\3.5\Options, add the string value "PowerOrphans" with the value "1."

Other cleanup features include a well-designed .INI file editor. A file-associations editor lets you view and modify the associations between file extensions and applications; this proved more usable and clear than the similar editor in Windows Explorer. Both 16-bit and Windows 95 versions come in the same package.

Except for its weak reporting, UnInstaller is without a doubt the safest of the application removers.

Except for its weak reporting, UnInstaller is by far the safest of the application removers. It leaves Registry entries and files that other programs remove, but it doesn't do any harm by leaving them, and you risk harm by removing them. □

UnInstaller 3. Estimated street price: $39.95. Requires: 386-based PC or better, 4MB RAM, 5MB hard disk space, Microsoft Windows 95. MicroHelp, Marietta GA; 800-777-3322; 770-516-0899; fax, 770-516-1099; http://www.microhelp.com. *Circle 455 on reader service card.*

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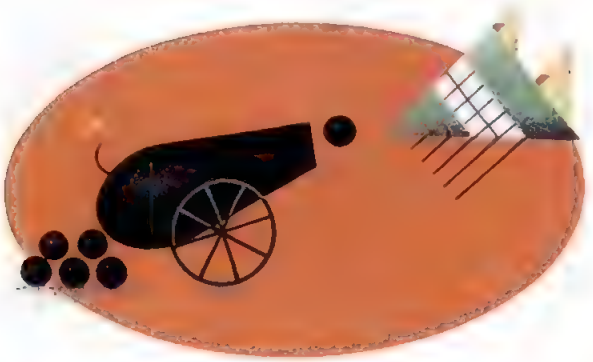


ANTIVIRUS UTILITIES

MISSING FROM WINDOWS 95'S COLLECTION OF UTILITIES IS AN ANTIVIRUS TOOL. FOR THE ULTIMATE IN VIRUS PROTECTION, CHOOSE FROM AMONG THESE NINE EFFECTIVE CONTENDERS.

By Keith Schultz

The 32-bit Windows 95 was designed to run older, 16-bit applications without any problems. That was good news for us, and it was good news for virus authors, too.

Windows 95, and all of its associated support programs and files, is just as vulnerable to virus attack as were DOS 6.2 and Windows 3.*x*. And with more and more people connecting every day to the Internet and other online services, the risk of infection increases even more. What we need now are new programs to help us keep our systems clean, warn us of possible danger, take advantage of the new operating system, and protect us from new breeds of 32-bit viruses such as the Word Concept macro virus and the recently discovered 32-bit Boza. Here we evaluate nine such packages. All offer direct support for Windows 95 or, at least, 32-bit engines.

Designers of antivirus utilities faced significant hurdles in their efforts to upgrade their programs to full Windows 95 compatibility. They had to deal with long filenames, compatibility problems with terminate-and-stay-resident (TSR) programs, and a significant change in the way the system accesses boot sectors of floppy disks. These major system changes forced near rewrites of all of the code to true 32-bit engines. Most of the software companies were up to the task, but only some can claim success.

No one program in this evaluation covers *every* feature we were looking for, but a couple come close. Prevention, detection, virus removal, performance, integration, and administration comprise the key components in antivirus software, and if any one of these features is missing, the product simply isn't complete—so you'll have to look for the one program that meets your needs the most.

Virus detection was a very important aspect of our testing, but not the only part. (If that were true, then a DOS-based scanner would be your antivirus tool of choice.) We also looked at the use of virtual device drivers (VxD) for real-time protection and tight integration with Windows 95's user interface.

Another key feature is the ability to notify others in your workgroup of a virus infection. But your software must have strong administrative abilities for virus protection across a LAN, so see our section on networked antivirus tools for further coverage.

S&S SOFTWARE INTERNATIONAL INC.

Dr. Solomon's Anti-Virus Toolkit

ALL REVIEWS BY KEITH SCHULTZ

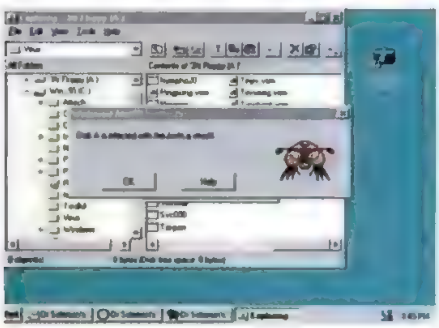
Dr. Solomon's Anti-Virus Toolkit ($125) nearly hits the bull's-eye as a Windows 95 virus scanner. This seventh version takes advantage of some Windows 95 features, such as the Taskbar and Explorer. It will even scan inside zipped files, albeit slowly. On our detection tests, Dr. Solomon's fell just behind the top three products in detecting our in-the-wild viruses, but it had some trouble repairing the infected files. Dr. Solomon's is also available in versions for DOS, NetWare, OS/2, and Windows NT.

To detect viruses, Dr. Solomon's uses

a mix of signature matching and checksumming. FindVirus, Dr. Solomon's virus scanner, will also run with a heuristic option that lets it look inside files for new virus code combinations.

WinGuard provides real-time protection for your system. The WinGuard module, which is based on a 32-bit virtual device driver (VxD), monitors all drives in the system during file reads and writes. WinGuard correctly identified boot-sector viruses on an infected floppy disk and successfully blocked infected file copies to and from our test system, even across the network.

Dr. Solomon's Anti-Virus Toolkit can check for viruses inside archives made with most common file archivers, including PKZIP and ARJ. If you choose to do this, expect your scan times to increase dramatically. You can scan your system or individual files from either the main menu or from



Dr. Solomon's Anti-Virus Toolkit alerted us to a boot-sector infection on our floppy disk.

the Windows Explorer. To help simplify your virus scans, Dr. Solomon's includes a very flexible program scheduler: Simply choose the time and day for the scans, as well as when to repeat the scan. Dr. Solomon's also detects and removes the Word Concept macro virus.

File-repair functions in Dr. Solomon's Anti-Virus Toolkit go no further than renaming or deleting irreparable infected files. Unfortunately, you cannot attempt to repair on a file-by-file basis. To disinfect, you must scan the entire drive.

Dr. Solomon's includes weakly implemented activity logging and offers no provisions for e-mail or other means of notification. But the product's first-rate documentation includes the 268-page Virus Encyclopedia—also available on disk and updated on S&S's Web page—which makes up-to-date material on viruses possible.

Norton AntiVirus for Windows 95
Norton AntiVirus for NetWare

The Chicken Little predictions of 8,500 known viruses attacking your PC have not come to pass—and they probably never will. But for the 200 or so that truly exist in the wild, no better desktop protection exists today than our Editors' Choice, Symantec Corp.'s Norton AntiVirus for Windows 95. Symantec's Norton AntiVirus for NetWare Version 2.0 receives our Editors' Choice for networked antivirus protection.

Norton AntiVirus, the most consistent of the products we tested, made excellent use of Windows 95's features and detected nearly every virus we threw at it. A highly customizable utility, Norton AntiVirus also makes very effective use of Windows 95's tabbed dialog box metaphor.

Though DOS-based TSRs have proved effective at detecting viruses, they don't always work under Windows 95. As a result, Norton AntiVirus uses a VxD (Auto-Protect) for real-time signature scanning. Scanning inbound and outbound files, along with all inserted media, Auto-Protect caught 100 percent of our boot-sector and file-based viruses and let only two polymorphic viruses slide. Norton AntiVirus can also detect viruses in .ZIP files. We were also pleased to find that the utility could detect *and remove* the Word Concept macro virus.

Is there any room for improvement here? Sure. Norton AntiVirus could offer users more control when they use the AutoProtect module. Currently, you can't make the module scan a particular directory or file.

Command Software Systems' F-Prot Professional for Windows 95 deserves honorable mention here. Although it lacks the smooth Windows 95 integration of Norton AntiVirus, it was virtually unbeatable when it came to virus detection.

Ultimately, Dr. Solomon's Anti-Virus Toolkit has emerged as a solid antivirus product for Windows 95, with first-rate detection that is only slightly hindered by its lack of file-cleaning abilities.

Dr. Solomon's Anti-Virus Toolkit. List price: $125 (includes four quarterly updates). Requires: 386-based PC or better, 4MB RAM, 10MB hard disk space, Microsoft Windows 95. S&S Software International Inc., Burlington, MA; 800-310-9078, 617-273-7400; fax, 617-273-7474; http://www.drsolomon.com. *Circle 444 on reader service card.*

COMMAND SOFTWARE SYSTEMS

F-Prot Professional for Windows 95

F-Prot Professional for Windows 95 ($169.90), from Command Software Systems, builds on an already good reputation by upgrading to a new 32-bit engine. Although F-Prot doesn't take full advantage of Windows 95, it does offer excellent protection from virus attack. In fact, F-Prot's virus detection bested all others on our in-the-wild virus tests.

A new virtual device driver (VxD) comprises the heart of F-Prot's real-time protection. F-Agent is responsible for the detection of viruses on inbound and outbound files and also checks files on access. Configuration options range from what action to take when F-Agent detects an infected file to whether to scan the complete memory area for viruses. We tried to copy an infected file from another Windows 95 PC to our test machine, and F-Agent stopped the file transfer before the file made it to the hard disk. F-Prot also catches the Word Concept virus but cannot remove it as yet.

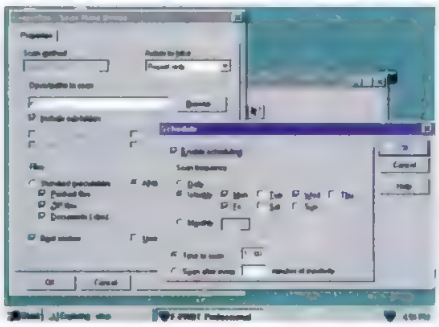
When you want to scan a specific drive or folder, you must create or modify a task to accomplish this. Also, unlike with PC-cillin and VirusScan, you can't initiate a scan from the Windows Explorer. For

Antivirus Software

■ YES ■ NO Products listed in alphabetical order	Dr Solomon's Anti-Virus Toolkit	F-Prot Professional for Windows 95	IBM AntiVirus Desktop Edition	Integrity Master	Norton AntiVirus for Windows 95	PC-cillin 95	ThunderByte Anti-Virus Utilities for Windows 95	Virus Alert	VirusScan for Windows 95
Install creates rescue disk by default	■	■	■	■	■	■	■	■	■
Includes native uninstall feature	■	■	■	■	■	■	■	■	■
Install program scans memory prior to installation	■	■	■	■	■	■	■	■	■
Scans boot sector	■	■	■	■	■	■	■	■	■
Can restore master boot record	■	■	■	■	■	■	■	■	■
Can restore partition table	■	■	■	■	■	■	■	■	■
Scans compressed files	■	■	■	■	■	■	■	■	■
Scans memory	■	■	■	■	■	■	■	■	■
Can schedule automatic scans	■	■	■	■	■	■	■	■	■
Reports scan results on screen/file log	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Includes innoculation feature	■	■	■	■	■	■	■	■	■
Can scan inbound/outbound files	■ ■	■ ■	■	■	■ ■	■ ■	■ ■	■ ■	■ ■
Scans files on access	■	■	■	■	■	■	■	■	■
Detects/removes Word macro viruses	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Virus list updates are available via BBS/Internet	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■

each task you create, you can choose what types of files to scan. This allows you to have one task defined for a scheduled scan and another for a quick check.

F-Prot showed more agility than most of the other programs with file disinfection. One missing option, though, is the ability to move infected files to a safe location so that you can review them later. Administration constitutes a weak spot in this otherwise fine product. Once F-Prot completes a scan and you close the activity log, you cannot go back and review it. You can save the log, but the program doesn't prompt you to do



F-Prot Professional's scheduler lets you set your system to regularly scan for viruses.

so before it's too late. But F-Prot alerts with beeps, and if you're on a network, F-Prot outshines its competition by alerting with an e-mail or broadcast message.

As the most effective virus detective, F-Prot Professional for Windows 95 gets high marks. It will be an even stronger product when it integrates with Windows 95 and adds a few administrative details. **F-Prot Professional for Windows 95.** List price: $169.90. Requires: 386-based PC or better, 4MB RAM, 2MB hard disk space, Microsoft Windows 95. Command Software Systems, Jupiter, FL; 800-423-9147, 407-575-3200; fax, 407-575-3026; http://www.commandcom.com. *Circle 447 on reader service card.*

IBM CORP.

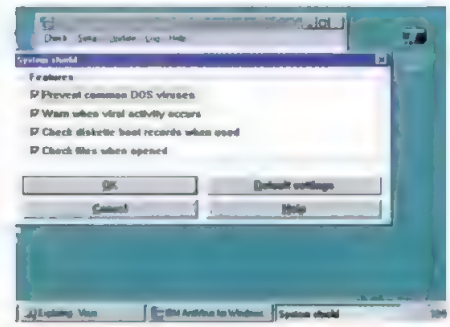
IBM AntiVirus Desktop Edition

IBM Corp.'s IBM AntiVirus Desktop Edition ($49) lacks all of Windows 95's refinements, such as right-mouse-button support and property sheets, and makes no use at all of the Windows Explorer. Its performance was among the slowest in the group. On our detection tests, IBM AntiVirus did well in detecting our in-the-wild viruses, partly because of its fuzzy scanning technology, though its virus-removal functions didn't perform as well.

IBM AntiVirus—which ships with DOS, OS/2, Windows 3.*x*, and Windows 95 versions all in one box—uses a combination of full-signature scanning, change detection, and fuzzy scanning to detect the presence of viruses. Fuzzy scanning flags a file as possibly infected by recognizing a *partial* signature match.

As with VirusScan, the IBM AntiVirus standalone scanner module couldn't read the boot sector of 11 of our infected disks and couldn't find the boot-sector viruses as a result. But System Shield, IBM's real-time scanning module, should be able to detect most diskette-based viruses that the scanner misses, although it missed a few of our boot-sector viruses.

IBM has streamlined the whole scanning process, so you can be up and running quickly. For most, the default options are sufficient. Power users, though, may want a little more control, like the ability to include or exclude drives and file types to scan. IBM AntiVirus will scan inside compressed files, but only those archived with



IBM AntiVirus's System Shield provides real-time protection for virus prevention.

PKZIP or LZEXE. And although it detected the Word Concept macro virus in our test files, it was unable to remove it from the document. A fix should be available by the time you read this.

Like a few other vendors, IBM believes in virus removal from files, but we

Our engineers blew out a few pocket protectors on this one.

Sam "Guru" Miller,
Manager, New Product Development

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Performance Testing: Antivirus Scanners

How We Tested

PC Labs' virus detection tests were performed by the National Computer Security Association (NCSA) and based upon its virus scanner certification process. The NCSA (*www.ncsa.com*) is an independent organization that provides security, reliability, and ethics information and services to the corporate and vendor communities.

Of the estimated 8,500 known viruses, very few are seen outside of testing laboratories; the actual number of viruses *in the wild* is significantly smaller—only 184, according to the February 1996 issue of the WildList, a compendium of virus incident reports from 37 virus industry professionals tracked by Joe Wells, a well-known virus expert. These viruses pose the most significant threat to end users and are the most critical for an antivirus program to identify.

We divided our testing into four parts. First, we scanned one or more files infected with each of the viruses on the WildList. Next, we scanned between 2,000 and 3,000 instances of five wild polymorphic viruses. We then scanned the boot sectors of 75 floppy disks infected with wild viruses. Finally, we scanned over 2,600 files infected with *zoo* viruses—those not actually found in the wild.

When interpreting the results, users should place the most emphasis on the wild viruses. While viruses do occasionally move from the zoo collection to the wild, the move is slow, and antivirus software manufacturers will most likely have updated their signature library to address these viruses before users encounter a problem. Most of the programs also provide additional tools such as integrity checking to identify unknown viruses.

Users should also focus on the results of the polymorphic tests. These viruses are typically more difficult to detect because they change their characteristics with each infection. A program that catches some but not all instances of a particular polymorphic virus gives users a false sense of security and leaves them in a vulnerable position.

Two of the products, IBM AntiVirus and McAfee's VirusScan, were unable to scan 11 of the infected floppy disks because the floppy disks were unreadable using standard DOS calls. This is a dangerous situation: The viruses can still spread if the user accidentally boots from the floppy disk, even if he receives a "non-system diskette" error message. Both companies acknowledge the problem. McAfee will have a fix in an upcoming release. In addition, each product will detect viruses with their real-time protection programs, which reinforces the point that no one protection scheme in any anti-virus program adequately prevents infections.—*Analysis by Ben Z. Gottesman and Dr. Richard Ford*

Each figure reported for a given product represents the number of problems *missed*

Lower scores represent better performance. Red type denotes an optimal score

	IN THE WILD (Viruses spreading in the real world)				ZOO (Viruses found only in laboratories)
	File viruses	Polymorphic viruses	Polymorphic replicants	Boot-sector viruses	File viruses
Out of ▶	179 viruses	5 viruses	11,190 replicants	75 viruses	2,631 infected files
Dr. Solomon's Anti-Virus Toolkit	0	2	5	0	15
F-Prot Professional	0	0	0	0	45
IBM AntiVirus Desktop Edition	0	3	27	11	66
Integrity Master	6	2	2,002	1	105
Norton AntiVirus 95	0	1	2	0	31
PC-cillin 95	5	3	3,219	0	0
ThunderByte Anti-Virus Utilities	N/A	3	16	0	28
Virus Alert	0	0	0	1	9
VirusScan	0	1	80	11	67

N/A—Not applicable: The product did not complete this test.

found IBM AntiVirus's cleaning abilities somewhat unreliable, since IBM AntiVirus waits until the scan is complete before notifying you of any virus activity. None of the products can clean all infections, but some are better than others: F-Prot and VirusScan successfully removed viruses from files without damaging them.

IBM AntiVirus logs all activity to file and keeps a cumulative log of all scans. Alerting is very basic: It's limited to DOS screens when a file copy is performed, followed by a file copy error message. Also, no support for e-mail or any type of external notification exists.

Ultimately, IBM AntiVirus offers good virus protection but gives modest Windows 95 integration and slow performance.

IBM AntiVirus Desktop Edition. Estimated street price: $49. Requires: 386-based PC or better, 4MB RAM, 2MB hard disk space, Microsoft Windows 95. IBM Corp., IBM AntiVirus Products and Services, Sterling Forest, NY; 800-742-2493; http://www.brs.ibm.com/ibmav.html. *Circle 448 on reader service card.*

STILLER RESEARCH

Integrity Master

One of our two DOS-based antivirus programs, the 32-bit Integrity Master, $35 from Stiller Research, does more than just scan for viruses. It detects any form of file corruption, whether caused by virus attack or faulty hardware. The user interface is easy to navigate, and online help is plentiful.

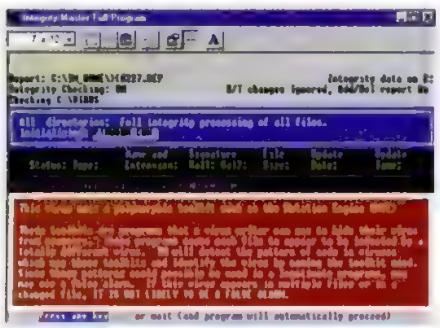
Integrity Master uses a combination of signature matching and file-by-file checksumming to determine if a virus has attacked your system. It then checks the files against the checksum data and investigates those that have changed. Besides keeping track of your files, Integrity Master creates backup images of your system setup area (CMOS) and your hard disk boot sector. In the event of a hard disk error, you can reload the images from a floppy disk to restore the system.

Integrity Master has no real-time file input/output or on-access scan capabilities. To determine if you have a virus infection, you must perform a scan of the hard disk. Note also that Integrity Master focuses on integrity checking, not signature scanning, as its primary means of detection, which

could explain its poor performance on our signature-based detection tests.

However, you can easily scan for virus activity with Integrity Master. You have complete control over how Integrity Master checks your system. You can specify which drive or file to scan or set it to scan only the boot sector.

Stiller Research believes that file *deletion* works best with viruses: No virus removal options exist. This new release can detect the Word Concept macro virus, but can't remove it. Integrity Master supplies a wealth of information about the type of virus found, along with possible ways to combat it. And the program sends all data created by the scan process to a log file,



When Integrity Master detects a virus on your PC, an alert pops up to give you information.

including the entire description of the virus and the damage it can inflict.

Integrity Master offers minimal administration features, but this program doesn't require much management. The installation program leaves out the creation of the Integrity Master group and associated icons. You must run a second setup utility to finish out the installation. Note that you can't view the activity logs at all from Integrity Master, but you can open them with any text editor. Unfortunately, the scant alerting limits you to audible tones and red entries in the on-screen activity report.

In the end, Integrity Master doesn't have the flash of a Windows 95 application, but it does hold its own with virus detection and most other forms of files corruption. **Integrity Master.** List price: $35. Requires: 8088-based PC or better, 400K RAM, 1MB hard disk space, Microsoft DOS 2.1 or later. Stiller Research, Colorado Springs, CO; 800-788-0787, 719-533-1879; fax, 719-533-1728; http://delta.com/stiller/stiller.htm. *Circle 449 on reader service card.*

A New Virus Threat

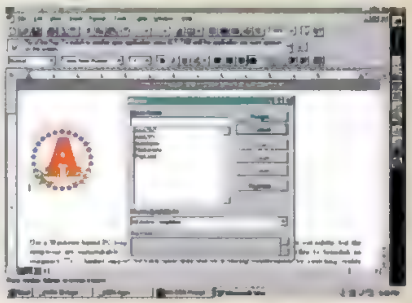
By Ben Z. Gottesman and Keith Schultz

Until last year, viruses were known to attach themselves only to programs and boot sectors. All that changed, however, with the identification of the Word Concept macro virus. Written in Microsoft's WordBasic scripting language, this virus embeds itself within the default document template and replicates to other Word documents: *data files.*

How serious is the threat from macro viruses? As with most virus issues, users should be aware of this new threat, but they needn't panic if they take the proper precautions. On the other hand, macro viruses demand that antivirus software vendors now look inside data files as well as program files—which is likely to slow the scanning process even more.

How quickly a macro virus can spread is subject to debate. However, viruses that infect popular programs such as Word warrant some concern, especially because workgroup computing has increased: Users often attach documents to e-mail messages or put them in a central place such as a BBS or FTP site. These viruses also emerged as the first to infect both PCs and Macintoshes.

At press time, at least six Word



Five macros in the Tools/Macro menu make up the Word.Concept macro virus.

macro viruses have been identified, as well as one for Lotus's Ami Pro, although few have been seen in the wild. Many of the antivirus products reviewed here *detect* the presence of some or all of the Word macro viruses. But with these viruses, disinfection of the document rather than deletion is especially important, and very few products—namely, Dr. Solomon's and Norton AntiVirus—currently do this.

SYMANTEC CORP.

Norton AntiVirus for Windows 95

Norton AntiVirus for Windows 95 from Symantec Corp. was the first antivirus software written for Windows 95, and it takes advantage of many of Windows 95's features. Priced at $79.95, it provides great protection against virus attack. It detected nearly every one of our in-the-wild viruses; moreover, it addresses the newest virus threat: macro viruses.

Norton AntiVirus' real-time scanning module, Auto-Protect, scans files for virus infection when inbound and outbound from your system—disk, network, or modem—as well as upon access. Auto-Protect lets you choose when to scan a file, how to respond to a virus detection, and what files to scan. The superb boot-sector protection detected all boot-sector viruses in our test sample. You can access Auto-Protect at any time by clicking on its icon, located on the Windows 95 Taskbar. It can't choose a particular directory or file to scan, though.

Norton AntiVirus relies on signature matching, CRC checksum scanning, and heuristics for virus detection. You can

Norton AntiVirus for Windows 95 lets you check for viruses at any time, day, or night.

initiate a scan of a hard disk from the Norton AntiVirus main menu, or you can scan a single file simply by browsing for it from

Finally, a multimedia notebook powerful enough to replace your desktop.

MICRON
ELECTRONICS, INC

The Millennia TransPort™

PC World reports in its March 1996 issue that *"...this Pentium 120 ran the new PC WorldBench tests faster than any other notebook we've measured..."* The April 1996 *Windows Sources* says, *"The Millennia TransPort, a bench-burner of a notebook...delivered the highest Winstone 96 score we've ever seen on a notebook: 53.3."*

Feature for feature this notebook gives you everything you need—whether you're working on the road or at your desk. According to *PC World*, *"If you have a 75, 90, or 100MHz Pentium PC on your desk, it will fairly crawl compared to Micron's Millennia TransPort."*
—*PC World*, March 1996

Performance that will take you where you want to go! *"Replace your desktop PC and your notebook with the Millennia TransPort? It might just be an even trade."*
—*Windows Sources*, April 1996

Start with blistering speed—133MHz mobile Intel Pentium® processor—add 256KB of pipelined burst cache and 16MB EDO memory and you've got all the power you need to conceive and execute the most sophisticated multimedia presentation.

Designed to work the way you do. The Millennia TransPort's unique FlexOpt™ design gives you not one but *two* bays for a real choice of notebook configurations. Add an extra lithium-ion battery to get more working time. Add an extra hard drive so you can store even the biggest ideas. Or drop in the quad-speed CD-ROM drive and enter the exciting world of multimedia. The choice is yours. Modular components make configuring your notebook as quick and easy as turning on your computer.

Product protection that's second to none. Micron is so confident in the design and construction of the Millennia TransPort that it's offering an industry first—the Micron Power℠ warranty*. It includes a five-year limited warranty on the microprocessor and main memory and a three-year limited parts-only system warranty.

The March 1996 *PC World* says, *"If you believe this notebook is only for engineers or lucky CEO's, think again..."* Go with the notebook that outperforms the rest—the Millennia TransPort from Micron.

intel inside pentium

Designed for Microsoft® Windows®95

800-250-5714
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MICRON ELECTRONICS, INC.

Spec it out!

133MHz Intel Mobile Pentium® Processor combined with 256KB of pipelined burst cache and 16MB of EDO memory provide the screaming performance you've come to expect from Micron.

11.3" Active Matrix Display shows you the big picture in vivid 800 x 600 eye-popping color.

PCI Graphics Accelerator provides blazing graphic performance with VGA, S-Video, and NTSC video outputs.

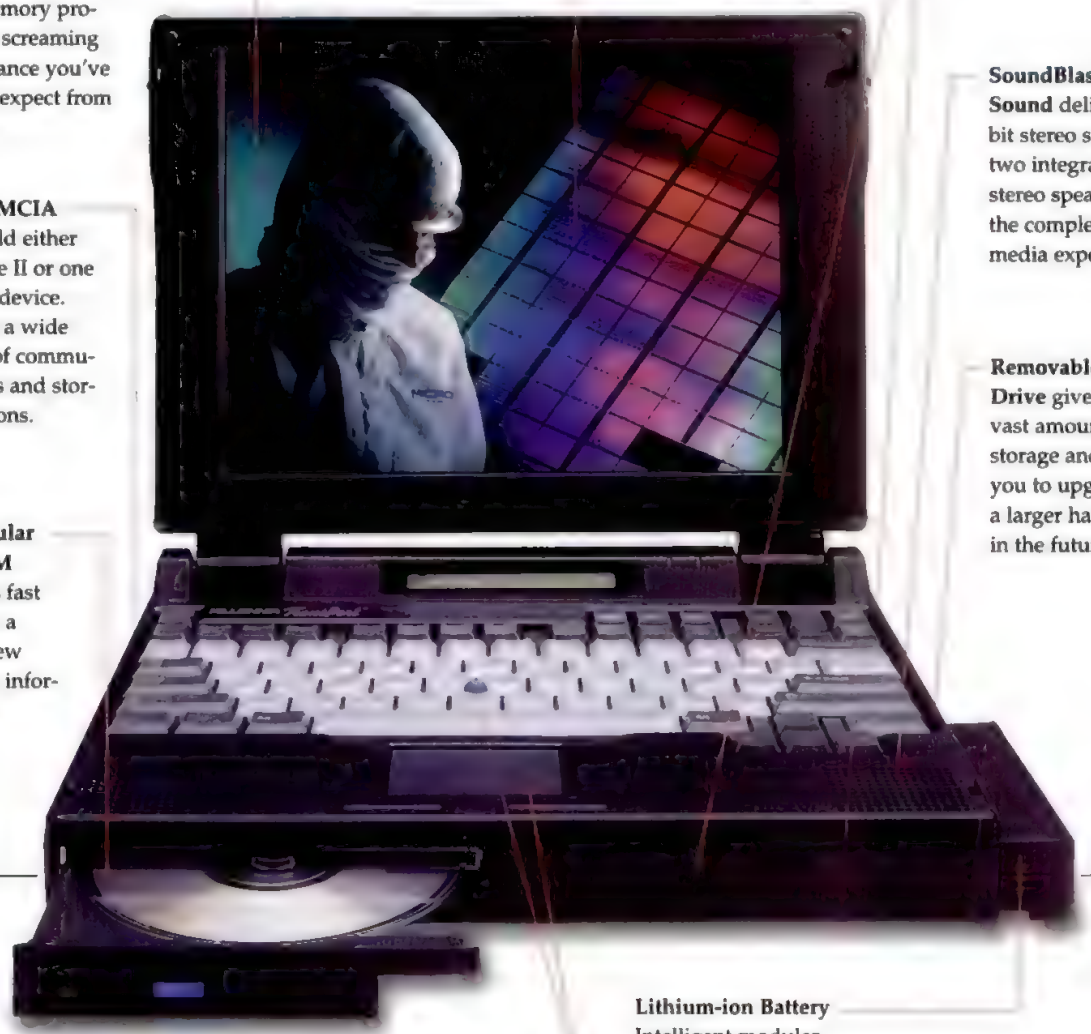
Dual Infrared Ports provide convenient IRDA-compliant wireless connection in front or in back.

SoundBlaster™ 16 Sound delivers 16-bit stereo sound to two integrated stereo speakers for the complete multimedia experience.

Removable 1.2GB Drive gives you vast amounts of storage and allows you to upgrade to a larger hard drive in the future.

Two PCMCIA Slots hold either two Type II or one Type III device. Handles a wide variety of communications and storage options.

4X Modular CD-ROM provides fast access to a whole new world of information.



Lithium-ion Battery Intelligent modular lithium-ion batteries give you the power to complete the job. Add a second modular battery in bay two and double your productivity.

Dual Pointing Devices The Pick-a-Point™ offers two pointing devices; choose either the touchpad or the pointing stick.

Modular Bay #2:

Intelligent lithium-ion battery

or

4X CD-ROM drive

or

2nd 1.2GB hard drive

or

3.5" floppy disc drive

Modular Bay #1:

Intelligent lithium-ion battery

or

3.5" floppy disc drive

Desktop Ready!

"An excellent entry into the mobile Pentium fray, Micron's Millennia TransPort offers a solid blend of features, performance, and design."
—*Windows Sources*, April 1996

Specifications

Common Features
- 133MHz Mobile Intel Pentium® processor
- Intel 430MX PCIset
- 256KB L2 pipelined burst cache
- EDO memory (48MB max.)
- 4X modular CD-ROM drive
- 11.3" SVGA color display, 800 x 600
- PCI graphics accelerator, 1MB RAM
- Pick-a-Point™ dual pointing devices integrate both pointing stick and touchpad
- Removable EIDE hard drive (1.2GB max.)
- 3.5" modular floppy drive
- Intelligent modular lithium-ion battery
- SoundBlaster™ 16-bit stereo sound
- Built-in stereo speakers and microphone
- 2 Type II or one Type III PCMCIA slots
- S-Video and NTSC video-outputs
- Headphone, microphone and line-in jacks
- 2 infrared ports, one front, one back
- Parallel, serial, VGA and 2 PS/2 ports
- Dimensions: 11.7" x 9.4" x 2.0", Weight: 6.9 lbs.†
- Nylon carrying case
- Microsoft® Windows® 95 CD & MS Plus! CD
- Microsoft Office Pro 95 and Bookshelf 95 CDs
- 5-year/3-year Micron Power℠ warranty*

Micron Millennia TransPort P133
- Intel 133MHz Pentium processor
- 11.3" active matrix color display, 800 x 600
- 32MB EDO memory (48MB max.)
- 1.2GB removable hard drive
- 2nd intelligent modular lithium-ion battery

Options

- **MicronDock™ multimedia port replicator**
  Ethernet LAN adapter, SCSI-2 port, S-Video and NTSC video outputs, built-in stereo speakers, infrared port, headphone, microphone, line-in jacks, parallel, serial, VGA and 2 PS/2 ports.....**$299**

- **MicronExec™ desktop package**
  Matching black 17" monitor (15.8" display)
  Matching black mouse and keyboard (can be used with or without MicronDock).....**$799**

- Motorola Montana 28.8 fax/modem supports regular telephone connections, cellular phones and two-way paging devices.....**$299**
- 2nd intelligent modular lithium-ion battery.....**$199**
- 2nd 1.2GB modular hard drive (2.4GB total).....**$599**
- 16MB EDO memory upgrade.....**$699**
- Leather carrying case upgrade.....**$ 59**

*Micron Power℠ Warranty & Support

- 5-year limited warranty on microprocessor and main memory
- 3-year limited parts-only system warranty
- 30 days of free Micron-supplied software support
- 30-day money-back policy
- 24-hour technical support

All sales are subject to Micron's standard limited warranties and terms and conditions of sale. Copies of the limited warranties may be obtained by calling Micron

800-250-5714
http://www.mei.micron.com
MICRON

the Scan menu item. (By dragging the file onto the Norton AntiVirus icon, you can also easily scan a single file.) Norton AntiVirus can also scan files inside a PKZIP archive. In this regard, scanning speed was on par with other products reviewed here. Norton AntiVirus also has an inoculation feature that protects a file from any type of change, intended or unintended.

Norton AntiVirus was able to clean most of our infected file sample, leaving the original file intact. If you choose not to delete the file when Norton AntiVirus detects a virus, it gives the file a .VIR extension and leaves it in the same directory.

Norton AntiVirus's user interface makes good use of Windows 95 tab folders, allowing quick access to all of the available options. The right-mouse-button brings up a context-sensitive help screen. Norton AntiVirus's activity logging, one of the best we've seen, provides extensive filters and print options. But the program limits alert options to a pop-up message or an audible beep when it discovers suspicious activity. You won't find any provisions for pager or e-mail alerts in this product, either. But Symantec promises such support in its summer '96 release of Norton AntiVirus.

Undoubtedly Norton AntiVirus measures up as both a strong Windows 95 application and an exemplary virus detective.

Norton AntiVirus for Windows 95. List price: $79.95. Requires: 386DX-based PC or better, 4MB RAM, 10MB hard disk space, Microsoft Windows 95. Symantec Corp., Cupertino, CA; 800-441-7234, 541-334-6054; fax, 541-334-7400; http://www.symantec.com. *Circle 453 on reader service card.*

TOUCHSTONE SOFTWARE CORP.

PC-cillin 95

One of the more visually appealing packages in our roundup, PC-cillin is geared toward the novice user whose needs include ease of use and friendliness. The $49.95 product—which ships DOS, Windows 3.*x*, and Windows 95 versions in the same box—can automate nearly the entire virus protection process for you.

PC-cillin detected all of our boot-sector and zoo viruses but missed five of the common viruses on our tests. Though the version of PC-cillin we tested didn't detect or clean the Word Concept macro virus, a new version (which should be available by the time you read this) will be able to. PC-cillin does search for viruses inside archives compressed with most popular file-compression utilities. Advanced features include automatic scanning of incoming files from BBSs or the Internet (through the serial port) as well as one-touch virus signature upgrades.

To identify viruses, PC-cillin uses a combination of signature matching and VICE (Virus Instructional Code Emulator) scanning. Using heuristics, PC-cillin can identify an unknown virus and add the new signature to its virus database. PC-cillin includes Smart Monitor, a module that graphically displays the amount of system protection in use and the level of the virus threat.

PC-cillin's Smart Monitor shows the amount of virus protection and the level of the virus threat.

You can perform all of your scanning, cleaning, and configuration routines from PC-cillin's main menu. PC-cillin's menu lets you initiate a scan at the drive or folder level, or you can scan directly from the Windows Explorer by clicking your right mouse button. Scanner configuration options in PC-cillin are meager compared with those of Norton AntiVirus or McAfee's VirusScan, and you can't automate the cleaning of infected files.

PC-cillin's real-time protection is good but not complete: It stopped infected files during a file copy to and from our test PC and on access. When we tried to copy an infected file from our test PC to another Windows 95 computer, however, PC-cillin detected the virus but allowed the copy to continue anyway.

To remove a virus, PC-cillin's Clean Wizard guides you smoothly through the cleaning process. But when we tried to clean the infected files on our system, we found that PC-cillin often couldn't remove the viruses. Like VirusScan, though, PC-cillin makes good use of Windows 95 and creates a visual and file report of the scan. But PC-cillin won't become a major player in the war on viruses until it better removes and detects macro viruses.

PC-cillin 95. Estimated street price: $49.95. Requires: 386-based PC or better, 4MB RAM, 2.5MB hard disk space, Microsoft Windows 3.*x* or later. TouchStone Software Corp., Huntington Beach, CA; 800-531-0450, 714-969-7746; fax 714-960-1886; http://www.antivirus.com. *Circle 454 on reader service card.*

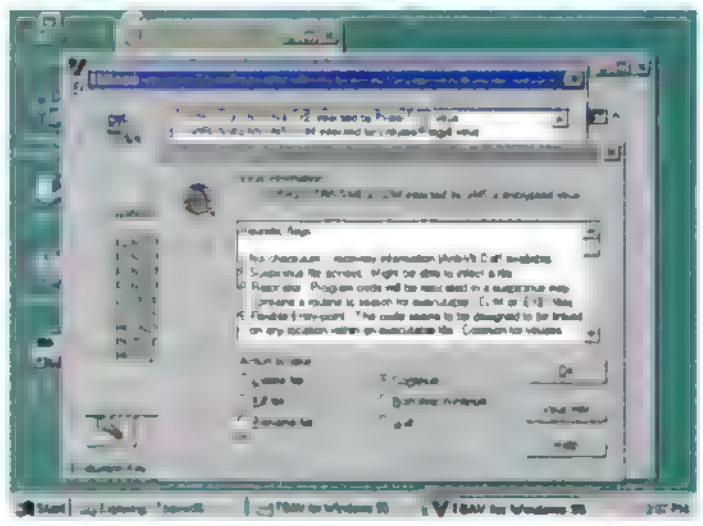
THUNDERBYTE CORP.

ThunderByte Anti-Virus Utilities for Windows 95

ThunderByte's flagship antivirus program, ThunderByte Anti-Virus Utilities for Windows 95 ($99) takes advantage of some of Windows 95's features and provides you with a good front-line defense against virus attack.

ThunderByte's real-time scanning doesn't quite match that found in the other products reviewed, but it can handle the newest class of virus threat: macro viruses. The program caught all the boot-sector viruses in our test suite, but it experienced occasional lockups and was unable to complete our test of files infected with in-the-wild viruses.

ThunderByte uses five detection methods to determine if a virus has infected a file. In addition to active monitoring (real-time file-activity checking) and signature matching, ThunderByte uses heuristics and CRC checksums. The fifth—and most advanced—method, called real-code emulation, simulates the execution of the file in memory and looks for any type of virus activity. This procedure detects encrypted viruses because such viruses must *decrypt* before they can



When ThunderByte detects a virus, it gives you information and prompts you for a response.

run. ThunderByte sees this activity and flags the file as infected.

You have the choice of automatically starting ThunderByte when Windows 95 launches. The company recommends doing this because ThunderByte must be running for the real-time file I/O protection to be active. ThunderByte does not dock to the Taskbar as other Windows 95 products do; it's simply minimized. Unfortunately, the file monitor didn't seem to detect most of our infected file copies either from the floppy disk or on the local hard disk. A version that solves this problem should be available by the time you read this.

Like VirusScan and PC-cillin, ThunderByte can scan files directly from the Windows Explorer. ThunderByte also comes with a set of predefined scans, which simplifies the scanning process.

ThunderByte doesn't remove or disinfect files from the Windows environment. You must boot from a DOS system diskette and use ThunderByte's DOS version to clean the drive. Activity logging is good, and you can pick what information you want to see in the log. Alerting, also complete, includes pop-up windows. But ThunderByte doesn't provide broadcast or e-mail notification of virus alerts.

Though it's one of the best boot-sector virus detectors on the market, ThunderByte unfortunately falls short in real-time detection and integration with Windows 95. **ThunderByte Anti-Virus Utilities for Windows 95.** List price: $99. Requires: 386-based PC or better, 4MB RAM, 1MB hard disk space, Microsoft Windows 95. ThunderByte Corp., Messena, NY; 800-667-8228, 315-764-1616; fax, 315-764-1620; http://www.thunderbyte.com. *Circle 459 on reader service card.*

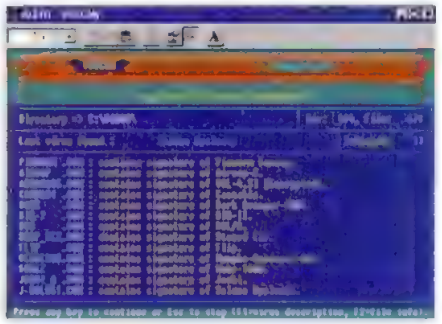
LOOK SOFTWARE SYSTEMS INC.

Virus Alert

One of the two 32-bit DOS-based virus scanners in the market today, Virus Alert 4.1 ($69.95) from Look Software uses a DOS TSR to perform its real-time scanning. Under Windows 95, though, Virus Alert doesn't quite make the grade.

On our detection tests, Virus Alert missed only one boot-sector virus and nine zoo viruses in our sample. But this product's TSR for real-time file monitoring is not Windows 95–compatible (Look Software expects to have this fixed by the time you read this), and the user interface lacks any integration with the operating system.

Virus Alert uses signature matching to detect known viruses and relies on a helper program, Onguard, to monitor the system in real time. This TSR tracks all file reads and writes from floppy disks and stops viruses before they can invade your system. Unfortunately, we experienced severe lock-up problems when the TSR was active on Windows 95. Without the TSR, you must rely on your disk scans to detect a virus infection.



Virus Alert was the best scanner out of the nine reviewed, but it lacks real-time scanning.

You can scan your system using your own command line parameters, a feature that would be handier if the software included more accessible documentation: You must scroll through the documentation files just to find the list of command line switches and then either memorize them or write them down to implement later. If the built-in scans don't suffice, you'll have to print out the help files.

Virus Alert proved impressive in sniffing out the viruses from our test collection. Its delete-and-restore methodology serves as its cleaning philosophy: You can delete the infected files and then restore them only from a backup—a process you may not always find convenient. Virus Alert can detect macro viruses in Word documents but will not remove them.

Virus Alert's manual also needs a little work. In the section about cleaning boot-sector viruses, we came across references to DOS's FDISK utility. The manual explains that you can repair most boot-sector viruses using FDISK's /MBR option, a tool that restores your master boot record. But this can be a devastating move if your system is infected with a virus that encrypts and moves a boot sector, as does Monkey. Look Software plans to add a warning to the manual in the software's next release.

On the whole, poor Windows 95 support along with the absence of real-time file monitoring limits Virus Alert, an otherwise appealing virus-detection program. **Virus Alert 4.1.** Estimated street price: $69.95. Requires: 386-based PC or better, 4MB RAM, 2MB hard disk space, Microsoft DOS 3.3 or later. Look Software Systems Inc., Ottawa, Ontario, Canada; 800-678-5511, 613-822-2250; fax, 613-822-2160; http:// www.look.com. *Circle 461 on reader service card.*

MCAFEE ASSOCIATES

VirusScan for Windows 95, BootShield

A veteran in the antivirus wars, McAfee' VirusScan for Windows 95 ($65) proved the most Windows 95-ready of all the antivirus products in this evaluation.

VShield 95, McAfee's real-time virus protection, is available via the Windows Taskbar, and you can scan for viruses right from the Windows Explorer. On our detection tests, VirusScan for Windows 95 missed only one in-the-wild file infector but, like IBM AntiVirus, skipped 11 boot-sector viruses. The boot-sector misses occur because of the way Windows 95 accesses the boot sectors on floppy disks. McAfee is aware of this and plans to have a fix for it in the next version. The program can identify macro viruses currently and should be able to remove the more common ones in the next release.

VirusScan for Windows 95 finds viruses and then disinfects your system.

BootShield ($35), McAfee's companion software, works with all DOS and Windows-based antivirus programs and

Has lived in New York all his life.
Never visited the Empire State Building.

includes McAfee's Scan for DOS. Its main component, BootLock, monitors the boot sector on your hard disk and effectively prevents a virus from modifying the boot sector, legitimately or not. BootLock will not keep a virus from attacking the file allocation table or the system setup (CMOS) areas of your computer directly, though.

While BootShield protects your boot sector from virus attack, VirusScan uses Code Tracing for rule-based signature scanning and Code Matrix to identify polymorphic viruses. VShield easily caught files copied to and from our test system across the network and from a floppy disk, and it also stopped infected files from leaving the system.

McAfee has enhanced VirusScan with new features such as integration into Explorer's right-mouse-button functionality. A context menu can pop up with a Scan for Viruses option. In addition, you can scan a single file by simply dragging it onto the VirusScan icon. With VirusScan, you also can create VirusScan Configuration (VSC) files to eliminate reselecting scan options for often-repeated tasks. VirusScan will create a shortcut to VSC , so you can launch it from your desktop.

VirusScan was able to remove most of the viruses in our test sample. A right mouse click on the infected file brings up a menu that lets you choose how to handle the infected file. One of the few features missing from VirusScan is the ability to create a rescue disk, though it does ship with its own. Activity logging is solid if not too fancy, and integration with Windows 95 ranks first rate. In all, McAfee has delivered another fine product, and once VirusScan improves its boot-sector virus detection, it will warrant a wholehearted recommendation.

VirusScan for Windows 95. List price: $65. Requires: 386-based PC or better, 4MB RAM, 1MB hard disk space, Microsoft Windows 95. **BootShield.** List price: $35. Requires: 286-based PC or better, 640K RAM, 2MB hard disk space, Microsoft DOS 3.1 or later. McAfee Associates, Santa Clara, CA; 800-866-6585, 408-988-3832; fax, 408-970-9727; http://www.mcafee.com. *Circle 441 on reader service card.*

NETWORK ANTIVIRUS SOLUTIONS

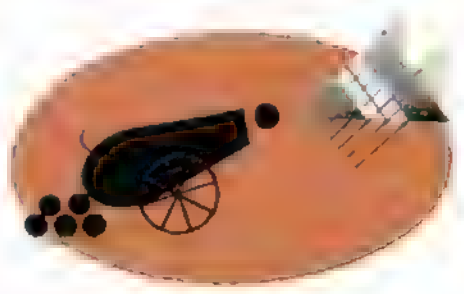
Your network file servers are the center for data storage, and they should be the center for virus detection. We've reviewed eight products that perform centralized virus protection on NetWare servers.

All of these products alert you when a binary intruder tries to sneak into your server. However, none except F-Prot and InocuLAN offers cleaning or disinfecting of viruses on the server; this is usually done at a client.

There are three reasons not to disinfect on the server. First is false positives. Even the best antivirus products can mistake a clean file for one with a virus and possibly delete your program or data. Second is performance. You don't want your network to slow down every time the NLM tries to disinfect a file. Third is safety. Just because a product says it cleaned a program, do you trust it with your most valuable data—the data on your server?

These products vary in what they let you do with infected files, the load they put on the file server, and the way that you control them. Some include client-side software that complements the server NLM. More important than a clever interface are good scanning options and great detection.

Watch prices carefully: Vendors offer a variety of pricing schemes. The vendor's reputation is important because you have to count on updates to the antivirus library. Speed, although an issue, is not a defining factor.



HERE ARE EIGHT PACKAGES THAT PATROL FOR VIRUSES ON YOUR NETWARE SERVER—AND HELP YOU COMBAT THEM.

By Steve Rigney

DOCTOR ANTIVIRUS FOR NETWARE

Thompson Network Software's product retails for $300 per server and supplies mainly the basics. Doctor has no client administration, so you have to rely on the console. Fortunately, Doctor offers both real-time and on-demand scanning and lets you schedule scans after hours.

Doctor lets you set up three different types of scan speeds: low, medium, and high. Unlike with InocuLAN, each setting performs the same scan but uses a different amount of CPU. The scan NLM detects only incoming files, so if a virus sneaks onto the network it could possibly infect users downloading files from that server. The NLM screen has an intuitive interface, but if you want to manage it remotely from a client PC you have to rely on NetWare's Rconsole or another remote utility.

When Doctor finds a virus it can either move the file to a safe directory or ignore it; you cannot rename or remove the file. We were impressed with Doctor's scanning speed on both clean and infected file transfers, but detection capabilities were not up to par. (Thompson Network Software Inc., Marietta, GA; 800-521-8849; info@thomnet.com. *Circle 513 on reader service card.)*

F-PROT PROFESSIONAL FOR NETWARE

Retailing for $495, this is the only product we know of that disinfects viruses on the server. Command Software Systems' F-Prot has a good Windows interface; it also did well on our scan speed test and

Was born and raised in Paris.
Has never been to the top of the Eiffel Tower.

missed detecting only one infection.

F-Prot offers real-time and on-demand scanning. You can schedule the scan or leave it to the NLM. If the NLM detects a virus it lets you move, delete, rename, disinfect, or log the offending file. No notification is built in, though, so you'll need to use a third-party solution.

Unlike NAV, F-Prot does not offer an attractive interface on the server. You can check scanner status, but you have no menu for changing settings. We found it hard to navigate through all features and settings without using the manual.

As with InocuLAN, you can use a single utility to create and deploy antivirus scans on multiple servers. You also can update the virus signatures on multiple servers from a single client PC. F-Prot is a little confusing, but its ability to take the cleaning off the client PC may save the network administrator a few steps. (Command Software Systems, Jupiter, FL; 800-423-9147; http://www .commandcom.com. *Circle 447 on reader service card.)*

IBM ANTIVIRUS ENTERPRISE EDITION

IBM AntiVirus ($995 list for a 50-user license) includes an NLM for detection, client software for detection and cleaning, and an intuitive interface. It detected almost every virus on our tests, including file infectors and polymorphic strands.

The package includes both a real-time and an on-demand scanning engine. But the real-time option can scan files only one way: either all incoming or all outgoing. Other products can scan incoming and outgoing files simultaneously.

IBM AntiVirus lets you rename, move, delete, or purge an infected file from the server's FAT tables; it also locks the file so it cannot be opened. You can change all the options from a menu on the server console. To disinfect a file, you must use the AntiVirus desktop software.

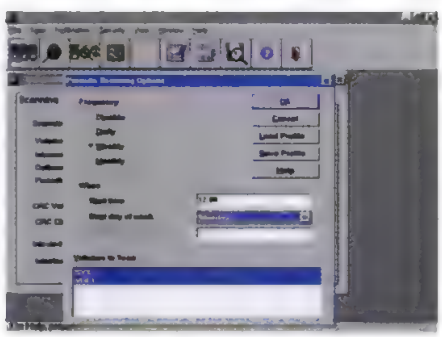
IBM AntiVirus keeps a log of all virus activity on your file server, including the node address of user who copied them there. You can also configure AntiVirus to notify you via e-mail using a MHS gateway or a NetWare broadcast message. (IBM Corp., Sterling Forest, NY; 800-742-2493; http://www.brs.ibm.com/imbav .html. *Circle 448 on reader service card.)*

INOCULAN 4.0 FOR NETWARE

Cheyenne's InocuLAN, our second favorite, offers easy installation, a good interface, and options. The unlimited edition is $995 per server; the 25-user package, $395. InocuLAN is ideal for large enterprise networks because it lets you monitor and control several servers running the NLM from a single location. It works with NetWare 3.*x* and 4.*x* servers.

InocuLAN has three types of scans: fast, secure, and reviewer—for various degrees of scan. The package offers real-time and on-demand scanning.

InocuLAN can log off any client PCs that are not running antivirus software. It can also distribute the client software and new virus signatures to client PCs. It can even create an emergency disk that contains system, CMOS, and directory information for client PCs.



NetShield performs real-time and scheduled scans for inbound and outbound files.

InocuLAN lets you remove, rename, purge, or delete an infected file. You can perform the clean function from the NLM server console screen, but it cannot clean during real-time scans, only during on-demand scans.

Although the software is not as powerful as NAV's, it has some useful utilities. One is the ability to detect the address of user who sent the virus to the server and send a broadcast message alerting him or her to the problem. InocuLAN was a leader on our scanning speed test and detected nearly all of the viruses on our detection test. (Cheyenne Software Inc., Rosalyn Heights, NY; 800-243-9462; http://www .cheyenne.com. *Circle 514 on reader service card.)*

INTEL LANDESK VIRUS PROTECT

Though part of the powerful LANDesk network-management suite, Virus Protect is strong enough to stand on its own. It retails for $995 per server and offers powerful NLM-based statistics and control. The NLM menu is great, and the Windows interface is even better. The Virus Protect NLM performs on-demand and real-time scanning and offers the best reports of any product in this roundup.

The Virus Protect scanner tracks multiple events—an infected file, checksum change, attempted modification, NLM unload, and even an out-of-data signature file. If any of these are triggered, it sends the information to the administrator.

Even with all of this checking going on, Virus Protect was near the top on our scan speed test. On our detection test, though, it was in the middle of the pack. Virus Protect limits anyone, even the supervisor, from copying infected files to or from the server.

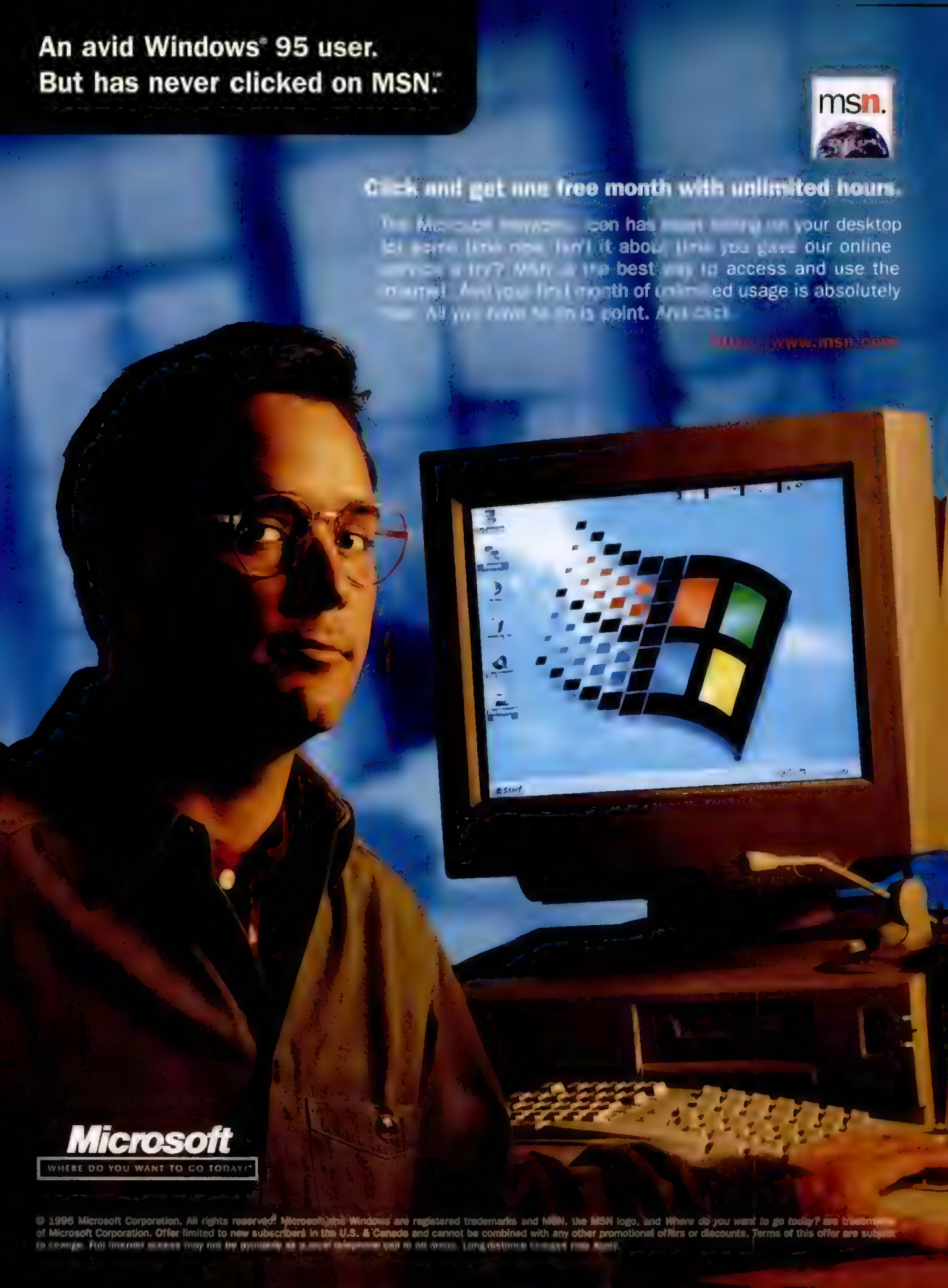
Our favorite feature is Virus Protect's customizable log files. You can configure them to report multiple virus encounters including date and time, logger, filename, virus name, action, and more.

Virus Protect lacks somewhat in notification; it has only basic NetWare broadcasts. You can, however, use the LANDesk Alert Management System for alerts and notification. It is part of the LANdesk package and costs $595 for five nodes. (Intel Corp., Hillsboro, OR; 800-538-3373; http://www .intel.com/comm–net/sns. *Circle 515 on reader service card.)*

NETSHIELD 2.3 FOR NETWARE

Probably the biggest name in virus detection, McAfee is also known for its unique dial-up product distribution system, which has infiltrated the company's products into organizations around the world. It's easy to try a McAfee product: Just dial up and download.

NetShield is fairly inexpensive, retailing at $450 for a 25-user license. Like the other products, the NetShield NLM is designed only for detection; you have to use the VirusScan client software to clean the infected files. Although all the products were pretty close in our scan speed test, NetShield surprised us by being near the bottom, particularly on our infected file transfer. However, NetShield did well on the detection phase of our tests.



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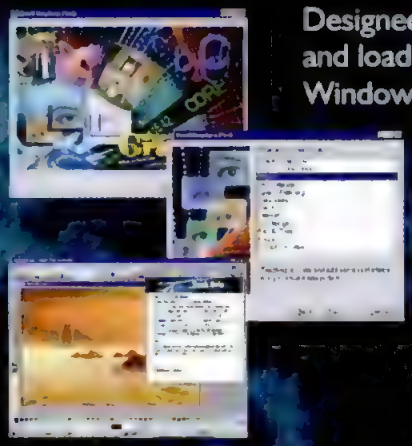

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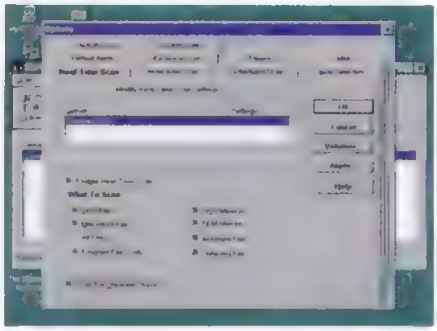
We were also impressed with installation. Netshield comes on a CD-ROM and includes all the updated NLMs you need for a NetWare 3.*x* or 4.*x* server. The installation creates an NCF (NetWare Configuration File) that automatically loads all of the NetShield NLMs.

The NetShield NLM performs real-time, on-demand, and scheduled scans for inbound and outbound files. It is fully configurable from both the server console and from a Windows utility and has excellent activity reporting options.



Among its strong features, Norton AntiVirus for NetWare includes great scanning options.

When NetShield detects a possible virus, it lets you ignore, delete, or rename the file. Netshield also offers excellent notification features that you can configure from the console. You can instruct it to send a page, use MHS-based e-mail, NetWare broadcast, or post a message on the console when it detects a possible virus. (McAfee Associates Inc., Santa Clara, CA; 800-332-9966; http:// www.mcafee .com. *Circle 441 on reader service card.)*

NORTON ANTIVIRUS FOR NETWARE

Symantec's entry earned our Editors' Choice with a great interface, easy administration, and good options. Norton AntiVirus for NetWare Version 2.0 (NAV) also performed well on our scanning speed test and detection test. NAV recognizes Novell's NetWare Directory Services (NDS) and thus will work with both your NetWare 3.*x* and 4.*x* servers. It retails for $599 for ten-user licenses, which include protection for servers and clients.

Installation went well; the scan NLM works in real-time or on-demand and includes a scheduling feature. The NLM will scan both inbound and outbound files. All of these settings are performed using a Windows utility on the client PC. However, you can start and stop a virus scan from the server console.

When a virus is detected, you can delete, rename, copy, or move the file, or deny access to the file until the virus is cleaned. You can customize the types of files you scan based on extensions.

One helpful option in the NAV Windows utility is the ability to determine how much of a load you'll allow the NLM to put on the server's CPU. The more CPU power you allocate, the faster the scan. The trade-off is reduced server performance. You can also keep a log of activity and choose both the type of scan and the notification options. If NAV detects a virus, it can send a NetWare broadcast message, e-mail, or a page. (Symantec Corp., Cupertino, CA; 800-441-7234; http:// www.symantec.com. *Circle 453 on reader service card.)*

VIRUSAFE LAN

Eliashim's ViruSafe ($999 list for an unlimited server license) consists of two pieces: ViruSafe LAN and ViruSafe NLM. You run the LAN portion at login time to protect your server from clients with viruses. The NLM is an on-demand scanner.

ViruSafe, however, does not have an intuitive interface, good documentation, or some of the utilities we look for in a powerful NetWare antivirus solution. Because ViruSafe doesn't offer a real-time scan, we could not complete our scanning speed test. ViruSafe also performed poorly on our detection test, especially when we scanned for polymorphic viruses.

Installation consists of running a DOS-based utility to copy files to the server. To use the NLM scanner remotely, you must also run VS.COM on each client PC. You also have to manually edit the Autoexec file on your server unless you want to load the NLM each time you restart NetWare.

You can schedule on-demand scans, but this requires configuration and monitoring. You can also rely on the client software, but smart users could disable that feature. When ViruSafe detects a virus, it can delete, move, ignore, or clean the file using the client software. The only notification is a NetWare broadcast to specific users. (EliaShim Inc., Pembroke Pines, FL; 800-477-5177; http://www.eliashim.com. *Circle 516 on reader service card.)* □

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(THAT'S IN THE PIPELINE. MEANWHILE, YOU WON'T FIND A FAX PROGRAM MORE ADVANCED THAN NEW DELRINA WINFAX PRO 7.0 FOR WINDOWS 95.)

Alas, Delrina developers still haven't figured out how to fax into someone's brain after 11 P.M. (when rates are lower) without waking him or her up. Fortunately, their latest release – new Delrina WinFax™ PRO 7.0 – is as easy and powerful as one would expect from the best-selling, most award-winning fax software in the world. It fully exploits new Windows® 95's 32-bit multi-tasking, multi-threading talents for true background faxing, greater speed and more. But it doesn't stop there. With the new TalkWorks™ telephony option and your voice modem, WinFax PRO 7.0 turns your computer into an integrated in-box for faxes, e-mail and voice mail. It even takes phone messages, distinguishes between fax and voice calls, has fax on demand and identifies callers before you pick up. And there's more. Built-in compression cuts fax transmission time (and phone bills) by up to one-third. It now supports gray-scale faxing, integrates with Microsoft® Exchange, and includes OCR, 101 ready-to-use fax cover sheets and tools to design your own. You can even get WinFax PRO as part of new Delrina CommSuite™ 95, the complete, affordable, integrated communications software solution for Windows 95. All of which should suffice until the new alpha wave faxing program is ready. (Hmm. Perhaps if we *partition* your brain so that one half can receive faxes while the other remains undisturbed...)

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FILE VIEWERS

NOTHING SPEEDS UP YOUR WORK LIKE A UTILITY THAT GIVES YOU A QUICK WAY TO LOOK AT YOUR COLLECTION OF FILES, WHETHER YOU HAVE THE ASSOCIATED APPLICATIONS OR NOT.

By Edward Mendelson

Windows 95 lets you give long names to your files, but long names can't tell you everything about what's inside the files. Every operating system has developed a small industry of utilities that let you view the contents of a file without opening the application that created it. The third-party viewer utilities written for Windows 95 support an unprecedented range of file formats, but they all present—to some degree—an interface that's inconsistent, awkward, or both.

Basically, a viewer shows you what's inside a file as quickly as possible. All viewers include the ability to search within a file for text and to zoom in and out of graphics images. Viewers should support all major word processing, spreadsheet, and graphics formats—and all existing packages do. Most support additional formats such as databases, presentation graphics, and obsolete DOS- and Unix-based word processor and spreadsheet formats.

As this story went to press, four 32-bit viewer utilities were on the market: Canyon Software's Drag and View 95, FTP Software's KEYview 4.2, Inso's Quick View Plus, and Pacific Gold Coast's TurboBrowser 5.0. You can call up the first three from the context menus in Windows Explorer and from the file management programs in packages like Norton Navigator and PowerDesk.

The more ambitious products support conversions between one format and another, but the full-scale file conversion programs common under Windows 3.*x* haven't yet arrived for Windows 95. If you want to convert one word-processing format into another, one spreadsheet format into another, or one database format into another, you may have to rely on the conversion filters built into your applications—or wait for a new generation of file viewers.

By the time you read this, Adobe Systems will have bundled two powerful viewer and converter packages recently acquired from Mastersoft: Viewer 95 and Word for Word (along with a document comparison utility) will form a $149 package called Adobe File Utilities. Note also that Windows 95 comes with Quick View, a reduced version of Quick View Plus.

CANYON SOFTWARE

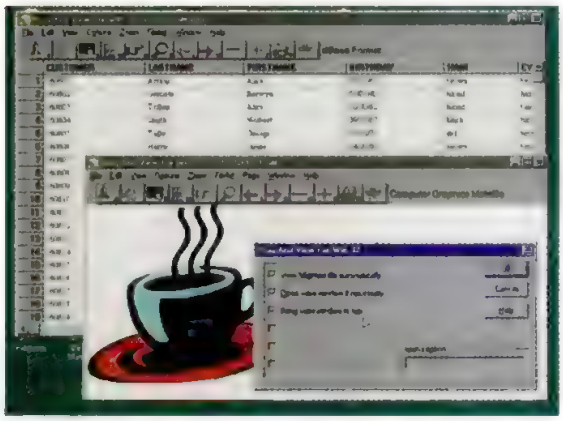
Drag and View 95

ALL REVIEWS BY EDWARD MENDELSON

Canyon Software's Drag and View 95 ($35 street) doesn't try to display every known word processor or graphics format, but because it's a multimedia player as well as a file viewer, it helps you manage file types that other viewers can't handle at all. It also lets you edit plain text files in its viewer. Drag and View plays Windows sound and video files, in addition to displaying standard word processor, graphics, spreadsheet, and database formats.

Under Windows 95, the program is designed to run only from the context menu (accessed with a right mouse click) of one or more selected files in an Explorer window; under Windows NT, it runs as a File Manager add-on or as an icon that serves as a drop target for files you want to view.

Once the program starts, you can use its File/Open dialog box to view additional files without opening another Explorer window. The program lets you open as many files as your computer's memory permits, and you can switch the display to each file in turn using keyboard shortcuts or a drop-down list. Drag and View displays all files in the same user-selectable font and size. It shows word processing files without formatted tables, graphics, footnotes, or columns. Spreadsheet charts and dBASE files appear in the form of their underlying tabular data. Unlike most other viewer software, Drag and View can display Adobe's PDF format, but more slowly and less accurately than it displays other graphics formats. File types not recognized by the program are displayed in ASCII or HEX mode.



Drag and View uses a customizable toolbar for most functions. You can also use the accelerator keys to access functions.

THE DIFFERENCE

Though Drag and View's multimedia support is nice, the package still lacks some features found in other viewers. The program can list the contents of .ZIP and .LZH compressed files, but it won't expand the compressed files so you can view them. The keyboard interface is inconsistent: You can access some of the items on the top-line menu with standard Alt–letter key combinations, but you have to press F10 and then a letter key to access others if you don't use the mouse. The command to print a file doesn't appear on the top-line menu at all, although you can access it from a customizable toolbar and a keyboard shortcut.

Any graphics file, whether vector or raster, can be converted into one of the raster formats supported by the program. But you can't convert word processing, spreadsheet, or database files between one application's format and another. You can select all or part of a file in the viewer and paste the text into a word processor or spreadsheet, but this technique is probably more primitive than the import features of your applications.

Drag and View isn't the most polished or ambitious viewer, but it's compact and unobtrusive, and it performs most basic viewing tasks. If you want to check it out for free, you can download a shareware version that comes with a limited set of viewers from Canyon's Web site.

Drag and View 95. Estimated street price: $35. Requires: 386-based PC or better, 8MB RAM, 4MB hard disk space, Microsoft Windows 95 or Windows NT. Canyon Software, San Rafael, CA; 800-280-3691, 415-453-9779; fax, 415-453-6195; http://www.canyonsw.com. *Circle 445 on reader service card.*

FTP SOFTWARE INC.

KEYview

FTP Software's $49.95 KEYview 4.2 displays standard word processor, graphics, and spreadsheet files, but you'll probably prefer it to other file viewers only if you need to view and convert files from Unix-based word processors such as Applix's Asterix or Quadratron's CliqWord and Q-One. As a Windows file viewer and converter (with 16- and 32-bit versions in the same package), KEYview performs basic tasks well, but it suffers from annoying interface flaws and disruptive bugs.

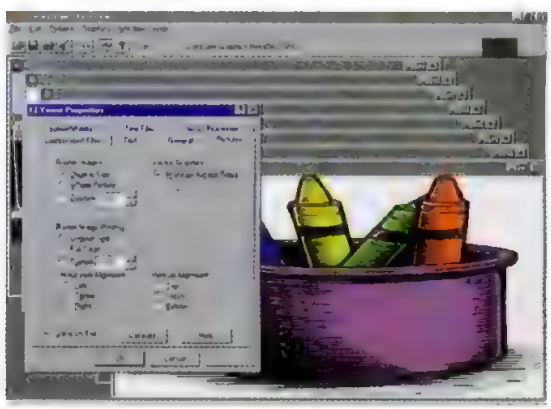
You can run KEYview as a standalone application that displays up to ten files at once. Alternatively, you can launch the viewer from a context menu in Windows Explorer. Either way, the viewer lets you convert files using the File/Save As menu, but the conversion module can also run standalone and in batch mode. The viewer displays standard word processor formats from Ami Pro to WordStar but not XyWrite. Graphics support covers standard bitmap, vector, and fax formats, including Encapsulated PostScript and Targa, but not CorelDraw or Photo CD. The only spreadsheets supported are Excel and Lotus 1-2-3, and the viewer offers no support for databases.

KEYview creates and opens compressed files in BinHex and Unix-standard formats like Tar, and it can open but not create .ZIP files. A copy of Adobe's Acrobat 2.1 viewer also comes in the package. If you open a file in a format for which you didn't install a viewer, the program offers to install the right viewer on the fly—although when we used this option with the DCX viewer, the program went into a loop and never installed the viewer.

KEY POINTS

KEYview displays pictures, tables, columns, and endnotes in word processing files, although footnotes can't appear at the foot of the page. You can search for text, delete or print files from the viewer, and extract an image from a fax file for copying or printing. An option to preserve the aspect ratio of CGM and .WPG vector images simply doesn't work, so these images always appear distorted. When you select a file to save from a compressed archive, the program doesn't remember the filename and makes you type it again.

When we chose a custom install, all shell extensions from other vendors disappeared from Windows context menus—and from the Windows registry—after KEYview was installed. This



KEYview's Maintain Aspect Ratio checkbox shown here simply doesn't work in the current release.

Quick View Plus

The Quick View mini-app that ships with Windows 95 is a useful addition to the operating system, but it's not all that powerful. Almost any of the other applications evaluated here do a better job, but none better than Quick View's own big brother and our Editors' Choice, Quick View Plus from Inso Corp.

A pioneer in the viewer utility market, Inso has packed Quick View Plus with more file viewer descriptions than you can count. This includes some Macintosh word processing formats and nearly any type of graphics file format you can imagine. Quick View Plus elegantly integrates with Windows 95 and other utilities. It also has some powerful search features that other applications lack. If, for example, you use Quick View Plus to display a file after performing a Windows 95 advanced find-file search, it automatically highlights the search text.

Though Quick View Plus can convert most graphics file types to .BMP files for use as Windows wallpaper, it really has little else to offer in the way of file conversion. For more esoteric file type support, you might want to look to FTP Software's KEYview, which handles a host of Unix-based word processors, including Applix's Asterix as well as Quadratron's CliqWord and Q-One. Canyon Software's Drag and View 95 doesn't handle as many exotic file as its competitors, but, notably, it can open and play a number of multimedia file types.

problem didn't occur when we chose the default installation option. (After we pointed out this problem, FTP prepared a patch, which can be found on its Web site.) KEYview installs itself in Netscape and Mosaic as the default viewer, so any .ZIP file you download opens first in KEYview before you get a chance to save it to disk.

KEYview's packaging describes the product as "the best Internet utility to view, print, and convert files," and especially useful for intranets in corporations that use mixed file formats. If you have hundreds of files in DEC WPS Plus or Wang WITA format that you want to view through a Web browser add-in, or if you're looking for file converters for Unix formats, then KEYview is the viewer you need. Otherwise, until FTP fixes the bugs in the next version, you may want to look elsewhere.

KEYview 4.2. List price: $49.95. Requires: 386-based PC or better, 8MB RAM, 5MB hard disk space, Microsoft Windows 95 or NT. FTP Software Inc., Andover, MA; 800-282-4387, 508-685-4000; fax, 508-794-4488; http://www.ftp.com. *Circle 450 on reader service card.*

INSO CORP.

Quick View Plus

If you own the CD-ROM version of Windows 95, you already have a copy of Windows' built-in file viewer, Quick View, and you shouldn't hesitate to upgrade to the full 32-bit-only version in the form of Quick View Plus ($49 street). Both versions come from Inso Corp., which last year acquired Systems Compatibility Corp., the well-known manufacturer of file viewers.

The reduced version that comes with Windows 95 and the commercial version both integrate tightly with Windows and third-party utilities like Norton Navigator and PowerDesk. The bare-bones Quick View offers a limited set of standard formats using a single font; the fuller Quick View Plus displays files in virtually every PC-based format, past and present.

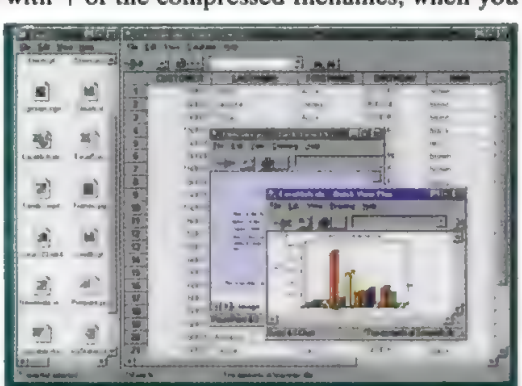
Quick View Plus doesn't convert files from one format to another, except for a command that converts any vector or graphics file into Windows wallpaper. You can save a file from the viewer window to the clipboard and then paste it into an application, but if you transport a word processor file in this way, you'll lose all footnotes and much of the formatting.

Quick View Plus, like Quick View, appears as an option on the context menu of files in Windows Explorer. After you open Quick View Plus from the context menu of one or a group of files, you can display other files by dragging their filenames to the viewer window. When you use Windows 95's built-in Find dialog to locate a file that contains specified text, and then use Quick View Plus to display the file, the file appears with the text highlighted.

DISPLAY AWAY

The program displays all significant PC-based word processor formats, and even older formats like XyWrite and DisplayWrite. HTML files appear complete with many up-to-date Netscape features. Quick View Plus also supports a wide range of Macintosh formats but far fewer Unix word processors than those covered by KEYview. All these files display fonts, graphics, and tables but not columns. Graphics support covers virtually every format used in the IBM-compatible universe. Spreadsheets and databases emerge in tabular formats, and spreadsheet charts display graphically. The program's spreadsheet support ranges from ancient Multiplan to the latest Quattro Pro versions, and databases range from FirstChoice to R:BASE, Paradox, and Access.

At any time, you can switch the viewer into hex or various plain text modes, including Unicode. Standard PC and Unix-based compressed formats appear in a list of the compressed filenames; when you



Quick View Plus lets you "tack" viewer windows to Explorer or let them float free.

File Viewers

PC MAGAZINE EDITORS' CHOICE

■ YES ■ NO

Products listed in alphabetical order	Drag and View 95	KEYview 4.2	Quick View Plus	TurboBrowser 5.0
Installs as a standalone viewer	■	■	■	■
Can search for text in files	■	■	■	■
Can convert graphics formats	■	■	■	■
Can convert word processor formats	■	■	■	■
Can display unregistered file types	■	■	■	■
Contains a hexadecimal viewer	■	■	■	■
Can display multiple text columns	■	■	■	■
File management features	■	■	■	■
Zoom feature	■	■	■	■
New viewers added as separate files	■	■	■	■

click on one of these names, the file displays in a second window, and you can save it to a disk in expanded form. If you view an executable file or DLL, Quick View Plus displays advanced technical information useful to programmers.

An installation option lets you install Quick View Plus as the default viewer in your Web browser. You may want to avoid this option, because Quick View Plus will open downloaded .ZIP files, and you can then save a .ZIP file only by extracting and saving its contents.

Keyboard users may feel shortchanged, because you need the mouse to return the cursor into the viewer window after using the Find command. You also can't use the keyboard to access the list of files in a compressed archive. But these minor flaws shouldn't keep you from adding Quick View Plus to your system, even if you supplement it with other utilities for converting files from one format to another.

Quick View Plus. Estimated street price: $49. Requires: 386-based PC or better, 4MB RAM, 5MB hard disk space, Microsoft Windows 95. Inso Corp., Chicago, IL; 800-333-1395, 312-329-0700; fax, 312-670-0820; http://www.inso.com. *Circle 456 on reader service card.*

PACIFIC GOLD COAST CORP.

TurboBrowser

Pacific Gold Coast Corp.'s TurboBrowser 5.0 ($50 street) fits on a single disk, and although it doesn't display nearly as many file types as other packages, it surpasses them in file management functions. Unlike Quick View Plus, KEYview, and Drag and View, it runs only as a standalone and can't be attached to the context menu in Windows Explorer. Instead, it acts as a substitute for Explorer, imitating many of Explorer's features in a more complex and confusing interface.

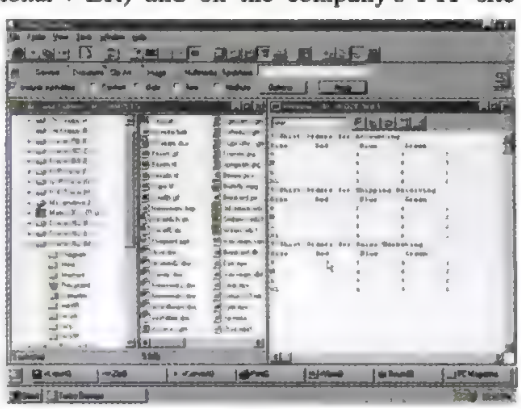
TurboBrowser normally displays two windows. One is an Explorer-style window with two panes—a tree-structured list of folders on one side and a list of files on the other. The other window shows the contents of the file selected in the file list. The top line menu includes file-selection options similar to those in Explorer, plus a keyboard-accessible option to reverse the sort order—an option available only with the mouse in Explorer itself. An optional toolbar includes menus that let you filter directory listings so that you see only the names of word-processor, graphics, spreadsheet, or other file categories—or only the names of files created by a specific application. Notably, TurboBrowser's search options—by exact-case text, approximate matches, and file attributes—offer more power than Explorer's.

TWO IN ONE

A second optional toolbar, called the Qbar, sits on the Windows desktop—outside TurboBrowser's own window—and serves as a drop target for filenames. You can drop filenames on buttons, which TurboBrowser stores for later operations. For example, if you drop filenames on the Export button, you build a list of files that you can then copy in bulk to a floppy disk. Similarly, you can convert graphics files stored on the Convert button to other graphics formats, and you can store miscellaneous file sets in a renamable Project button. TurboBrowser can extract ASCII text from word processor files and spreadsheets but can't convert one text format or spreadsheet format to another.

The viewer window displays all text, tables, and spreadsheets in a single font. Word processing files don't show graphics, and TurboBrowser displays columns in RTF files only. The program supports standard PC word processor, graphics, spreadsheet, and database formats—but you have to resize the preview window by hand to make .DBF files display in columns. And TurboBrowser sometimes misrecognizes formats: Some Excel charts and HTML files appeared as hexadecimal data. If a file won't display properly in the viewer, right-click on the filename and use the context menu to bring up Quick View or any other viewer installed in Windows Explorer.

TurboBrowser doesn't stand out as a file viewer, but if you want a file manager with lots of options in a small interface, you may prefer it to Windows Explorer. To test its unusual features you can download a time-limited but complete version from Pacific Gold Coast's forum on CompuServe (GO BROWSER) and on the company's FTP site (*ftp://members.aol.com/gobrowser*).



TurboBrowser's cluttered interface includes a folder list, file list, preview window, toolbar and the Qbar.

Though the unique Qbar feature saves time and effort when you need to print files from multiple directories at the same time, TurboBrowser's interface may feel overly cluttered for less complex file-management functions. □

TurboBrowser 5.0. Estimated street price: $50. Requires: 386-based PC or better, 2MB RAM, 3MB hard disk space, Microsoft Windows 95. Pacific Gold Coast Corp., Glen Cove, NY; 800-732-3002, 516-759-3011; fax, 516-759-3014. *Circle 460 on reader service card.*

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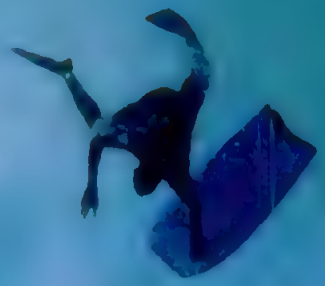

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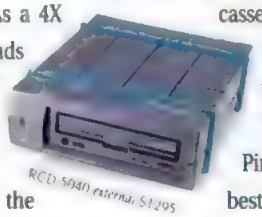

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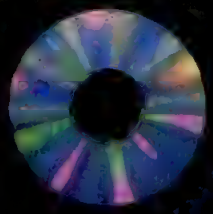

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MEMORY UTILITIES

UNDER WINDOWS 95, YOU MAY NOT NEED THEM OFTEN. BUT WHEN YOU DO, THERE'S NO ALTERNATIVE. WE TEST THE MARKET LEADERS TO SEE WHICH OFFERS THE MOST.

By Larry Seltzer

Do you need a conventional-memory manager under Microsoft Windows 95? The short answer is that most of the time most users don't. But there are a few special cases where a memory manager may be vital to run your application. To help you explore the options, we tested three Windows 95–compatible memory managers whose predecessors have been the mainstays of DOS and Windows memory management for years: Qualitas's MAX 8, Helix Software's Netroom 3.04, and Quarterdeck's QEMM 8. We show what Windows 95 can do on its own, what additional memory management can offer, and how these three products compare.

WHAT WINDOWS 95 CAN FIX

In exploring whether you need a memory manager, it's important to remember that Windows 95 solved many of the same problems memory managers solved under Windows 3.1*x*. The biggest change is that Windows 95 introduced support for 32-bit protected-mode drivers that consume no conventional memory. It ships with a huge collection of these drivers for many types of hardware, including mass-storage devices, network cards, CD-ROMs, PC Cards, modems, pointing devices and many other peripherals and adapters. Windows 95 also provides full-featured protected-mode network clients and protocols. The result is that even heavily configured systems may require no drivers whatsoever to be resident in memory below the 1MB mark.

Windows 95 and its native applications also place fewer demands on conventional memory (called Global DOS Memory under Windows) than Windows 3.1*x*; they avoid loading DLLs or drivers into conventional memory except when it's strictly necessary to do so (buffers for communicating with the system BIOS or real mode drivers are an example). All in all, most users of 16-bit and 32-bit Windows apps under Windows 95 simply don't have a problem with limited low memory.

Note that the Windows 95 upgrade installation program does not generally remove the real-mode drivers that loaded under Windows 3.1*x*, even when it loads 32-bit protected-mode replacements. This doesn't mean that you need memory management. Rather, it's an invitation to remove the unneeded drivers. Try removing them one by one, by commenting out the appropriate statements in your CONFIG.SYS and AUTOEXEC.BAT files (make backups beforehand). You'll probably find that most or all served no function and you'll find that you have far more memory in DOS sessions.

WHERE MEMORY MANAGERS CAN HELP

But there is one Windows 95 operating mode where third-party conventional-memory managers are as necessary as they've ever been: MS-DOS mode. This is Windows 95's DOS-compatibility mode, where the system boots into real-mode DOS 7.0 (when you exit MS-DOS mode, the system restarts back into protected mode). MS-DOS mode is necessary for compatibility with DOS applications,

mainly games, which simply will not run under the protected-mode environment provided by Windows 95. The culprit can be sheer incompatibility, or the difficulty may occur because DOS boxes under Windows 95 don't provide enough conventional memory.

Since MS-DOS mode is basically real-mode DOS, it gives you none of the protected-mode device support which makes memory managers unnecessary under Windows 95. You need to install your CD-ROM drivers, MSCDEX.EXE, network drivers, sound card drivers, and whatever else you might need to run the application you want. You'll also need to load SmartDrive again, since MS-DOS mode doesn't provide Windows 95's built-in disk cache. After you've loaded these, you'll find that conventional memory is scarce, so you'll need to start loading things into high memory. That's where memory managers start earning their keep.

TESTING MEMORY MANAGERS

We began our tests by setting up Windows 95 on a Hewlett-Packard XU P/90 with 16MB of RAM, loading the Windows 95 protected-mode drivers for the system's integrated-Ethernet and SCSI adapters, and for a Creative Labs Sound Blaster AWE card. With the system idle, we launched a DOS session (DOS box) and checked the amount of free memory under 640K (conventional memory) and the amount of free memory between 640K and 1MB (upper memory). We did not measure the amount of free extended memory (XMS) at this point, as DOS boxes do not report a meaningful XMS figure. We then launched a default MS-DOS mode session and measured free conventional, upper, and XMS memory. Next we configured a new MS-DOS mode session that loaded real-mode drivers for the HP's built-in SCSI and Ethernet adapters, the sound card, NETX, MSCDEX, DOSKEY, and IFSMGR. We then measured the new totals for all three memory types.

We repeated this procedure after installing each memory-management package and running its standard optimization tools (for detailed results, see the charts).

The utility of a memory manager also depends on its tools. All the packages reviewed here provide some form of system-analysis tool although we found that none of them was quite up to date, at least under Windows 95. While the Windows 95 device enumerator or system registry can provide a wealth of information about

Memory Utilities for Windows 3.1

By Larry Seltzer

If you are still running Windows 3.1*x*, you're much more likely than a Windows 95 user to be in need of a powerful memory-management package. We recently tested five leading memory-enhancement products that claim to fix a variety of limitations in Windows 3.1*x* by increasing available memory, boosting system resources, managing Global DOS Memory, and applying a variety of other techniques. Here's a summary of what we found (for full reviews, see "Windows 3.1 Memory Enhancement Utilities," February 20, 1996).

Hurricane 1.02 ($79.95), from Helix Software, the company which makes the Netroom product reviewed here, won our Editors' Choice award for essentially eliminating Global DOS and system resource limitations in Windows 3.1 while speeding up system performance. Hurricane also includes features that make the system more stable and provides an excellent set of system-analysis tools. We found that you must be willing to master some fairly advanced Windows concepts to get your system properly optimized. Helix expects to have a Windows 95 version of Hurricane out by the time this story appears.

The other four Windows 3.1*x* memory management products we tested all perform (or at least claim to perform) a technique called RAM compression. The idea is to compress some areas of memory so that you can fit more code and data into RAM. Quarterdeck's MagnaRAM 2 and QEMM 8 perform this trick under Windows 95 as well, but we remain skeptical of the theory behind it.

You can always make more room for programs by expanding the size of your swapfile, so the ultimate goal of RAM compression must be to improve performance by decreasing paging to the swap file. In our testing, we found that RAM compression increased system paging because it sets aside some portion of RAM to use as a buffer, thereby limiting the amount available for programs. This more than offset any gain from the compression.

SoftRAM95 2.0 (formerly $79.95; since recalled), from Syncronys Softcorp, was the most famous of the RAM compressors. But our testing clearly indicated that SoftRAM95 did not actually perform RAM compression. SoftRAM95 did not increase system resources as it claimed either, although its system-monitoring program presented numbers that seem to indicate that it did. As long ago as October 1995, Syncronys stated that SoftRAM95 failed to function under Windows 95 because of a bug. As we go to press, we are awaiting new SoftRAM releases for both Windows 3.1*x* and Windows 95.

We also tested RAM Doubler 1.02 ($99), from Connectix. RAM Doubler performs RAM compression but is more notable for doing a good job at expanding system resources. RAM Doubler might be the simplest program we've ever dealt with: You can give it to a complete novice and he or she could install it flawlessly.

Rounding out the field were Quarterdeck's MagnaRAM 2 and QEMM 8, both of which are also available for Windows 95. All of MagnaRAM 2's RAM compression features are bundled in QEMM 8. The RAM compression worked but resulted in slow system performance with almost no offsetting gain. QEMM 8 successfully boosted system resources and Global DOS memory, but not as much as Hurricane did.

system configuration, none of these products took advantage of this fact.

With Windows 95 having taken away most of its reason for existence, the sun is clearly setting on the era of the memory manager. But for running stubborn DOS games or for supporting older hardware that does not have protected-mode drivers, it may still be your only option.

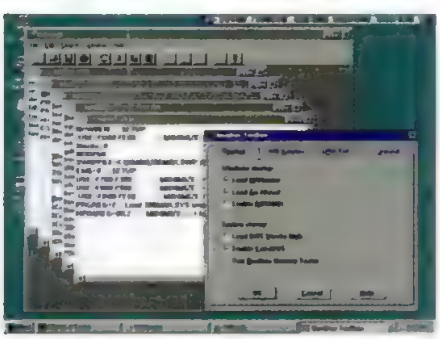
QUALITAS INC.

MAX 8

ALL REVIEWS BY LARRY SELTZER

Qualitas's MAX 8 is a Microsoft Windows 95–compatible upgrade to Qualitas's 386MAX product. It doesn't break significant new ground over the previous version, but setting it up and configuring it under Windows 95 was relatively smooth and painless.

On our tests, MAX 8's overall performance was respectable. It delivered as much conventional memory to MS-DOS mode sessions as Netroom, although it was not able to free up quite as much upper memory. We also noticed that MAX 8 consumed more extended memory than the other products we tested, a total of 496K.



MAX 8's easy utilities are behind the curve.

In addition to compatibility with Windows 95, MAX 8 has the ability to manage Global DOS Memory. This is arguably of little value under Windows 95, which manages Global DOS Memory pretty well on its own. Some Qualitas press releases have referred to Global DOS Memory in this context as a system resource. Semantics aside, MAX 8 does not actually manage *system resources*, which are a series of 64K memory heaps that Windows and Windows 95 use to store certain operating-system data structures.

Maximize, MAX 8's optimizing program, was as easy to use as the competition's, but we found one characteristic users should note: Instead of passing parameters to the memory manager loaded by CONFIG.SYS, MAX 8 stores its parameters in a Profile file named 386MAX.PRO, which it stores in the \QMAX directory. When creating multiple configurations, as we did in testing, each new maximization process overwrites the Profile parameters of the previous one. The solution is to create one Profile for each configuration you use and specify the file on the 386MAX .SYS command line in the appropriate CONFIG .SYS.

We ran into a minor configuration problem also encountered with Netroom. Part of MAX 8's maximization process, called ROMSearch, determines which areas of ROM in upper memory are expendable, and then it fills them in with RAM mapped from extended memory. The process was too aggressive on our system, and the system locked up when MAX 8 loaded after booting. We found that the problem was MAX 8's attempt to recover our F200-F300 memory range. Commenting out the appropriate line in the profile solved the problem.

MAX 8's utilities are well organized but provide less information than QEMM's or Netroom's. One tool, MAXedit, is a clone of Windows' Sysedit that can also edit the Profile. A potentially dangerous quirk of MAXedit is that it always edits 386MAX.PRO, even if you've specified a different file.

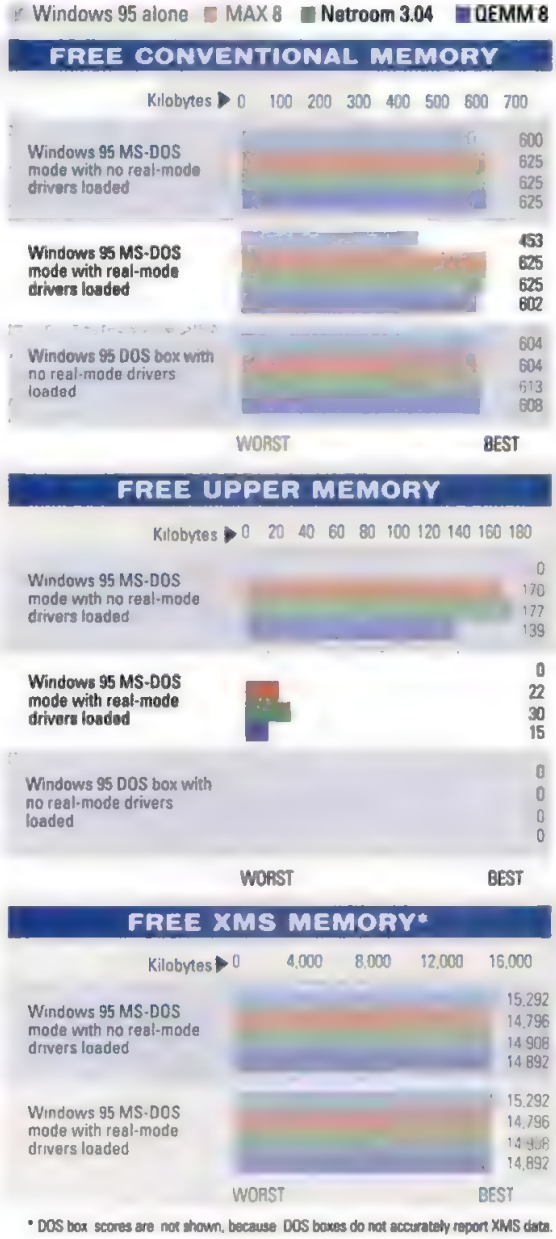
A small toolbar program called MAXmeter positions itself at the top right of the screen (overlaying any other toolbars you may have put there) and displays free User and GDI resources, as well as free Global DOS Memory. MAX 8 also gives you a centralized configuration program called the Toolbox.

Users of BlueMAX, Qualitas's specialized MicroChannel product, should buy Version 8.01 of MAX 8, which should be available by the time this story appears. Version 8.0 does not support BlueMAX.

MAX 8 is a good product for conven-

Windows 95 Memory Managers

Netroom provides the most memory—by a thin margin. For all products, the biggest gain is seen in DOS mode.



* DOS box scores are not shown, because DOS boxes do not accurately report XMS data.

tional memory management under Windows 95, even if it doesn't deliver quite as much free memory as the competition. As with QEMM and NetRoom though, it's of much less value than its predecessor was under 16-bit Windows 3.*x*.

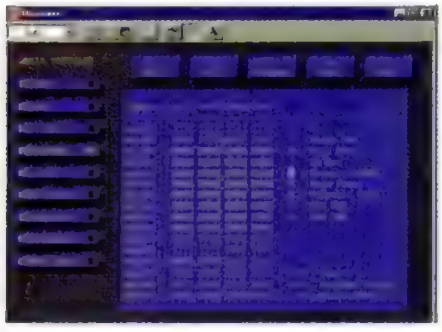
MAX 8. List price: $99.95. Qualitas Inc., Bethesda, MD; 800-733-1377; 301-907-6700; fax, 301-907-0905; http://www.qualitas.com. *Circle 480 on reader service card.*

HELIX SOFTWARE CO.

Netroom

Netroom 3.04, from Helix Software, was never designed to run under Windows 95, but it works. In fact, it works so well that it delivered the best memory optimization of the three products we tested. On the other hand, Netroom lacks the polished setup and dedicated tools you'd want in a Windows 95 product, and not all of its features worked in testing. Helix expects to deliver a Windows 95 version later in the year that should address these issues.

The secret to Netroom's memory prowess is *cloaking*, a technology for rewriting BIOSs and real-mode device drivers to a proprietary protected-mode API. Cloaked software runs in protected mode, leaving almost no footprint below the 1MB line. Netroom comes with cloaked system and video BIOSs to replace the real-mode ones you're using (the cloaked system BIOS was one of the features that didn't work on our test system). Some third parties have also written cloaked versions of their drivers (Stac Electronics' Stacker and various Logitech mouse drivers, for example). Netroom also comes with cloaked versions of other operating-system components such as the DOS stacks.



Netroom's DOS tools need an update.

Although Netroom yielded the best test numbers we saw, it took some effort for us to get it working right. Some of its more aggressive features were incompatible with our test system, and it took manual workarounds in order to get things working. Before we began installation, we were directed to make some small modifications to the MSDOS.SYS file (by the time you read this, Netroom 3.05 may be available, which should makes these modifications unnecessary). Despite these precautions, the system locked up during the optimization process, and it took a call to Helix tech support to find the correct command line parameters to solve the problem. Thereafter we had no trouble optimizing either the system as a whole or specific 7 sessions. Helix provides extensive notes for Windows 95 installation on its Web site and its CompuServe forum (GO CIS:HELIX). You should also check this information if you plan to upgrade to Windows 95 from a Windows 3.*x* system running Netroom.

Many users will get a feeling of déjà vu when they run Customiz, Netroom's memory optimization program. This is because Microsoft licensed a version of it to create MemMaker, the memory optimizer supplied with DOS 6.*x*. Customiz has additional features to work with Netroom, but it looks and feels quite similar.

Discover, Netroom's DOS-based system-analysis tool, provides a lot of information, but little of it is about Windows. Discover also makes extensive use of custom VGA fonts, which Windows does not support in a windowed session. Using the /CGA switch makes the display coherent but a bit plain. The DOS version of Discover pales in comparison to Helix's Discover for Windows, which ships with the company's Hurricane product.

If you need to free as much conventional and upper memory under Windows 95 as possible, Netroom is still the product to use—as it was with DOS and Windows 3.1*x*. We look forward to an update to bring its installation and tools up to date with the competition.

Netroom 3.04. Estimated street price: $69.95. Helix Software Co., Long Island City, NY; 800-451-0551, 718-392-3100; fax, 718-392-4212; http://www.helixsoftware.com. *Circle 479 on reader service card.*

QUARTERDECK CORP.

QEMM 8

Of the three products we tested, QEMM 8, Version 8.01, was the least effective at freeing up conventional and upper memory. But its installation and optimization processes are so smooth that you may be willing to live with a couple of dozen kilobytes fewer in order to avoid the hassles you may experience with the other products.

Setup for our tests ran without incident. In general, we found that QEMM made intelligent choices about what to do and what to leave alone. For example, Optimize, QEMM 8's configuration optimization program, does not default to using QEMM's most aggressive features—such as attempting to move ROMs out of memory in order to use their space for RAM. This is a good idea, since the feature didn't work with our test system when we expressly tried to use it.

QEMM 8's Windows tools focus on DOS.

Our test system was also unable to work with QEMM 8's Stealth feature. Stealth is a method by which QEMM swaps parts of DOS, the BIOS, and TSRs in and out of the area below 1MB. Under Windows, QEMM uses an expanded-memory page frame to do this. Optimize tested our system for compatibility with Stealth and, as often happens, found a problem. It then chose—quite properly—not to enable Stealth, and from there, the installation proceeded smoothly.

By default, QEMM installs its QuickBoot feature, which replaces the system reboot code with a routine that skips lengthy parts of the process. This speeds up system reboots so much that it can be disconcerting. If you're waiting to hit F8 (boot options), you can miss the moment

altogether. QuickBoot also speeds up the QEMM optimization process, which involves at least three reboots.

In fact, the only lengthy part of the optimization process occurs when QEMM is determining which of the millions of possible configurations is optimal. On our test system, Optimize started at about 80 million and counted down from there. The process takes a couple of minutes and we suspect that much of the actual time is spent simply displaying the countdown.

Quarterdeck integrates MagnaRAM, its RAM-compression product, with QEMM 8, and turns it on by default. In past testing under Windows 3.1, we found that MagnaRAM slows system performance without providing any significant benefit (for more details, see "Windows 3.1 Memory Enhancement Utilities," February 20, 1996). Ad hoc testing indicates that you would see similar results under Windows 95. The performance loss is likely to be insignificant, but it's unclear what benefit you get in exchange for it.

QEMM 8's system monitoring tools are all accessible from a single Windows-based program. Many provide a great deal of arcane information to sift through, but they are generally well laid out and accessible.

Manifest, Quarterdeck's system-analysis tool, is interesting but somewhat outdated. It mostly focuses on DOS-centric information, such as the memory layout below 1MB and in EMS, and every bit of detail it can get about your processor. When it comes to Windows information, however, Manifest falls short. You get very limited data on resource heaps and none of the information that Windows 95 provides about the devices in the system. Quarterdeck says that future versions may include such Windows 95–centric information.

If you need memory management under Windows 95, QEMM 8 won't give you quite as much memory as other products. But you'll have an easier time getting it than with any competitor we saw. □

QEMM 8, Version 8.01. List price: $99.95. Quarterdeck Corp., Marina Del Rey, CA; 800-683-6696, 310-309-3790; fax, 310-309-4219; http://www.quarterdeck.com. *Circle 478 on reader service card.*

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DIAGNOSTIC UTILITIES

LOOKING FOR THE ROOT OF A PROBLEM? NOT SURE YOUR PC IS RUNNING OPTIMALLY? THESE FIVE PACKAGES LET YOU TEST IT, TUNE IT, AND FIX IT.

By Barry Simon

PCs are wonderful when they are up and running smoothly. But your trusty companion quickly becomes a rabid hellhound when glitches arise. To its credit, Microsoft has addressed some of the leading causes of PC-induced headaches with the Device Manager and Add New Hardware wizard in Windows 95. These help users identify the IRQ and DMA resources claimed by their peripherals and make adding both Plug and Play and non-PnP devices less of a black art.

Going that extra mile, though, left at least a few furlongs to be covered by other products: Windows 95 diagnostic utilities that not only report on what system resources you have but also diagnose and help remedy anomalies. Such packages can uninstall programs, check for bad RAM modules, identify and prune duplicate files or unlinked ("orphan") DLLs, and check system performance and offer suggestions as to how you might improve it.

The wide-ranging utilities packages covered elsewhere in this issue offer some reporting and troubleshooting as part of their collections (see the reviews of Norton Utilities and the memory managers Netroom and MAX 8). But none go as deep as the dedicated diagnostic packages we review in this section. Four Windows 95 products in this roundup—American Megatrends' PC Care 95, DiagSoft's QAPlus/Win-Win, TouchStone's WinCheckIt, and Quarterdeck's WINProbe 4—share a similar scope and focus. All are aimed toward sophisticated users or people who are responsible for troubleshooting the PC problems of others. A fifth—CyberMedia's First Aid 95—focuses on software troubleshooting and is aimed at a broader audience of PC users. The Windows 95 version of Discover Pro, from Helix Software Co. (800-451-0551), was not ready in time for this review but should be available when you read this.

To test the breadth and depth of the features offered by the five utilities, we installed each one on four test PCs that varied in complexity. We then ran the reporting and diagnostic portions to see if the software could correctly identify the configurations. We also tested the cleanup and tune-up functions to gauge what type of advice the products offered on deleting files and changing settings (such as cache sizes). We found that their accuracy and saliency varied widely, so read carefully to see which package best suits your needs.

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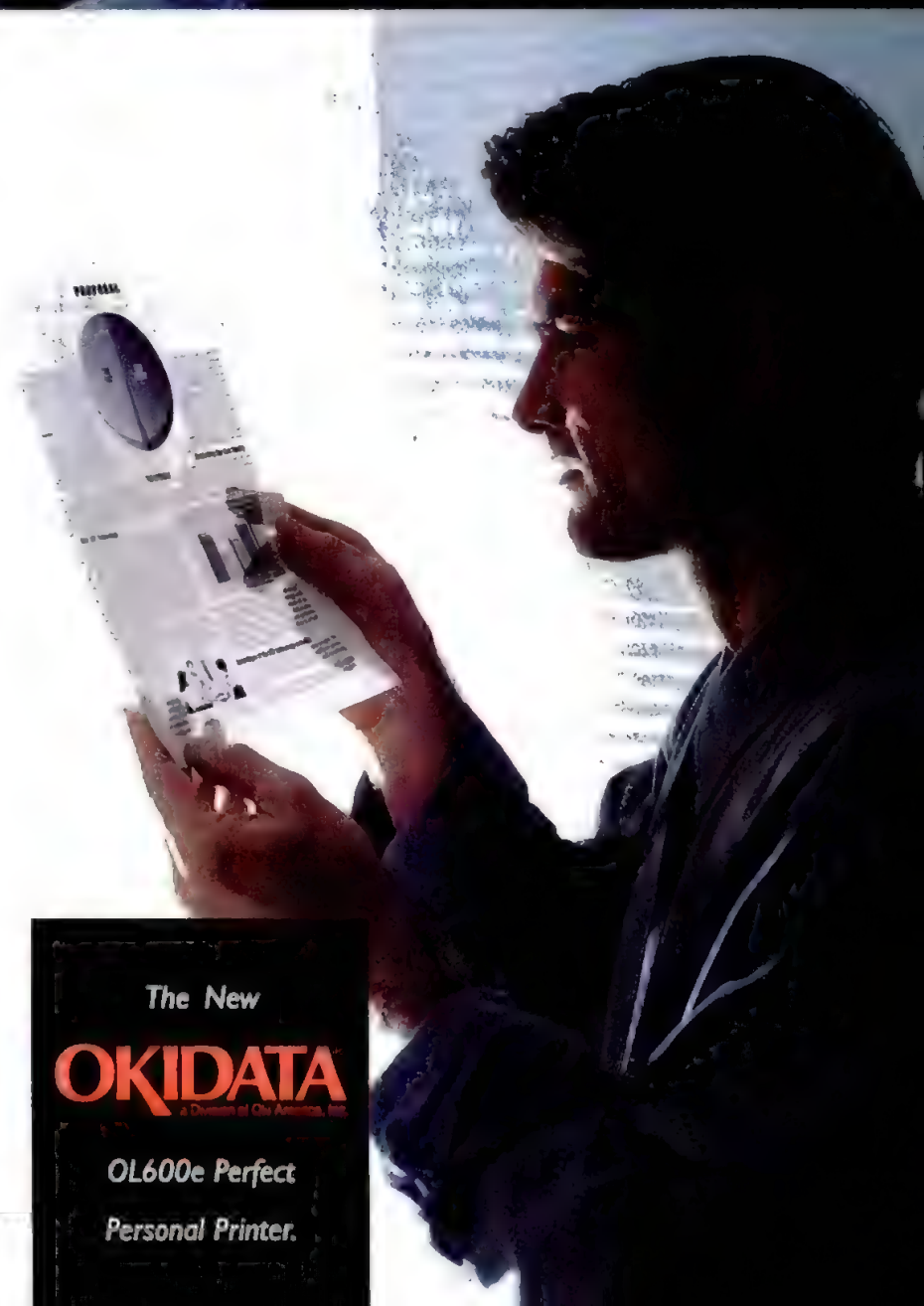
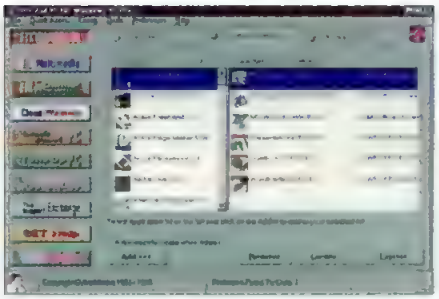


CYBERMEDIA INC.

First Aid 95

ALL REVIEWS BY BARRY SIMON

CyberMedia's First Aid 95 ($79 list, $50 estimated street price) breaks the mold of the traditional diagnostic utility. It doesn't do hardware subsystem reporting or complex hardware diagnostics, leaving those functions to Windows 95, but starts from the premise that many of the problems users encounter in Windows are



First Aid 95's intuitive interface gives quick access to its software-oriented functions.

software-based. Some of the ideas behind First Aid 95 are brilliant and could be exceedingly useful, but this first Windows 95 version has some glitches that need to be ironed out.

Perhaps the most welcome feature is crash protection. If a program generates a dreaded GPF (general protection fault), First Aid catches it and offers to let you save your work. On our tests, this feature worked reliably, though only with 16-bit applications; CyberMedia reports that support for 32-bit apps is a high priority and should be in the next release.

SUITABILITY TO TASK First Aid 95	
Reporting	N/A
Diagnostics	N/A
Tune-up	Good
Cleanup	Good

N/A—Not applicable: The product does not perform this task.

Another issue that First Aid tackles with aplomb is the misplaced DLL. The program uses its extensive database to check whether your application folders are missing required DLLs; it can then search your hard disk for any wayward ones and move them to the proper application. If a program you are running under Windows 3.1 or 95 can't find a DLL, First Aid pops up and offers to locate the DLL.

First Aid's uninstall module is limited to an explicit list of applications, though with more than 120 represented, the most popular ones are here. One nice touch: You can have it selectively uninstall particular application modules, such as a grammar checker.

First Aid will check desktop shortcuts to see if the programs associated with them are present and will also check the registry to see if any programs associated with the registered extensions are missing. But its logic is flawed. When we had no disk in drive A:, it informed us that a shortcut to A:\ was invalid and offered to remove the shortcut. And it got confused by paths with spaces in them, like those pointing toward files in Program Files.

The program ships with a knowledge base called Don't Panic, which is outdated: Its only printer advice is for Windows 2.1, and its information on Word for Windows is limited to Versions 1.0 and 2.0. By the time you read this, a database with an up-to-date list of technical-support phone numbers for over 2,500 vendors will have replaced Don't Panic.

Though some of the elements still need polishing, First Aid 95 offers enough useful features to make it worth the price of admission.

First Aid 95. List price: $79. CyberMedia Inc., Santa Monica, CA; 800-721-7824, 310-581-4700; fax, 310-581-4720; http://www.cybermedia.com. *Circle 473 on reader service card.*

Room for improvement

Though several of the diagnostic utilities we review here provide accurate, useful information, it is clear that these first Windows 95 versions need further polishing. We found several bugs that crashed our systems, as well as leftover advice suited to a Windows 3.1 system rather than the Windows 95 platforms we were testing.

What's more, not one of the five products excelled in all four categories: reporting, diagnostics, tune-up, and cleanup. Nevertheless, three products deserve an honorable mention.

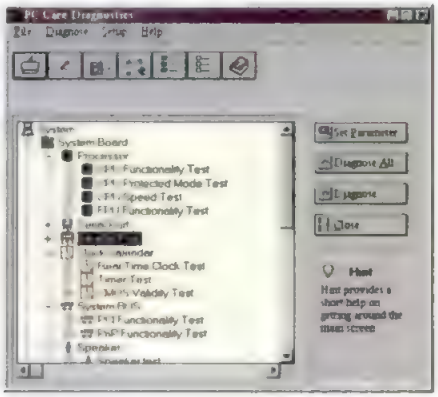
American Megatrends' PC Care 95 ($40 street) has excellent diagnostics and an ambitious (though not infallible) reporting module. The 1.0 version we looked at had a number of problems, chief of which were weak tune-up and cleanup functions. Similarly, CyberMedia's First Aid 95 ($50 street) offers a novel take on the category. Its ability to catch GPFs and let you save your work is unique (and welcome), but right now this feature supports only 16-bit applications. We also found some minor glitches in the cleanup module that need to be ironed out.

Finally, TouchStone's WinCheckIt ($50 street) remains the king of system reporting utilities for the accuracy of its results. But now that Windows 95 has system reporting built-in, this function becomes less important. WinCheckIt's other functions don't yet stand out the way its system reporting does.

AMERICAN MEGATRENDS INC.

PC Care 95

American Megatrends Inc. (AMI), maker of the AMI BIOS, has long used its expertise to produce one of the leading diagnostics programs. The company's first crack at a Windows 95 version, PC Care 95 ($40 street), has superb diagnostics, strong but flawed system cleanup modules, a some-



PC Care 95's excellent diagnostics module even includes PCI tests.

SUITABILITY TO TASK	
PC Care 95	
Reporting	Poor
Diagnostics	Excellent
Tune-up	Poor
Cleanup	Fair

what weak reporting module, and an unacceptable tune-up module.

If you want primarily a diagnostic utility, PC Care is the one to have. No Windows program has diagnostics as extensive or flexible. The package delivers four tests that help you root out hard disk problems (such as timing mismatches that could slow performance) and three tests for floppy disk drives, as well as tests for the PCI bus. There are tests for the PC speaker, graphics card, and CD ROM drive but none for sound cards.

PC Care is unique among the products in this roundup in having a time-saving batch mode for diagnostics. You can set up a test, save it as script, then load and run that script on all the PCs you need to check.

The reporting module in PC Care is extremely ambitious, conveying information that other programs do not handle about PCI-bus and BIOS options. But it had problems on our tests, crashing on two of the four test systems. AMI traced the problem to a PnP string in early Plug and Play BIOSs and has remedied the problem in an interim release.

On our typical systems, PC Care's reporting module worked fine. But on our most complex test system—where you would really need help beyond what Windows 95 delivers—PC Care missed one of the sound card IRQs, the network card IRQ, and two DMA channels. The multiple partitions on our 4GB disk confused it, and it got the amount of memory on the graphics card wrong. AMI is investigating.

The tune-up module in the version we reviewed still needs work. For example, it contained advice suited for Windows 3.1 but not Windows 95 (recommending that we install SmartDrv, which is built into Windows 95). Its ability to check and tune cache states and FIFO (first in, first out) states is a plus, and AMI promises work in this area to improve tune-up capabilities by the next release.

PC Care comes with two cleanup modules. One is an uninstall utility; the other searches for duplicate files, orphaned DLLs, and the like. But the module that finds orphaned DLLs is flawed and could remove essential files. For example, it said that the file PTTVIEW .DLL was orphaned because the associated .EXE (the Power Point Viewer) was not registered in the Start Menu. It even said one of the DLLs needed to run PC Care's own uninstall program was orphaned because that DLL is called by a second DLL rather than an executable. Again, AMI reports that these have issues have been addressed.

PC Care 95 has a solid scope, but AMI needs to smooth this version's rough edges.

PC Care 95. Estimated street price: $40. American Megatrends Inc., Norcross, GA; 800-892-6627, 770-246-8600; fax, 770-246-8790; http://www.megatrends.com. *Circle 474 on reader service card.*

DIAGSOFT INC.

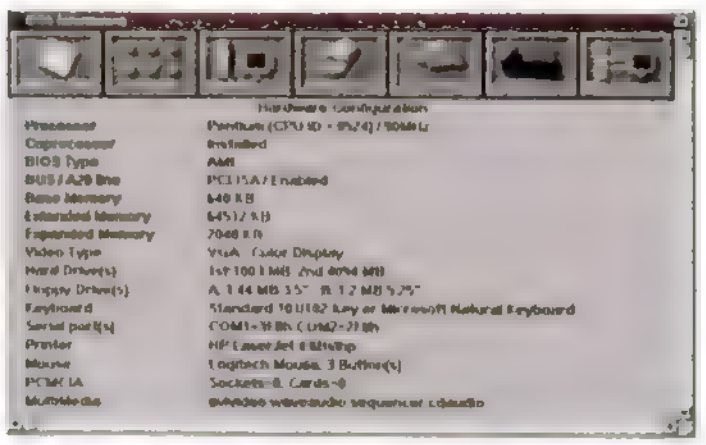
QAPlus/Win-Win

Unlike the other products in this roundup, DiagSoft's QAPlus/Win-Win ($65 street) has stayed focused on the traditional strengths of the category: reporting and diagnostics. While you get both the Windows 95 and Windows 3.1 versions in the box (hence the double *Win* in the name), you don't get tune-up or cleanup modules. Its diagnostic module is adequate, but the reporting utility could stand improvement.

SUITABILITY TO TASK	
QAPlus/Win-Win	
Reporting	Fair
Diagnostics	Good
Tune-up	N/A
Cleanup	N/A

N/A—Not applicable: The product does not perform this task.

On our complex machine, QAPlus's report missed both of the IRQs taken by the sound card. On another 486 test machine, it claimed that a free IRQ was occupied and knew that one IRQ was in use but didn't identify it as a SCSI card. It reports nothing about DMA channels, I/O ports, or the PCI bus, Plug and Play, SCSI IDs, graphics board memory, and serial UARTs. In its favor, QA's reporting of Windows' technical parameters (such as the metrics used by the display driver) is



QAPlus/Win-Win generates clear reports of your system's resources.

DIAGNOSTIC UTILITIES

How to Read the Suitability to Task Boxes

Whether you are an IS manager responsible for other people's PCs or a power user who wants to keep tabs on what's going on inside that box, diagnostic utilities are handy tools to have around. They can pinpoint conflicts, check that your PC's subsystems are running correctly, and help you tune parameters to ensure optimal performance.

SUITABILITY TO TASK	
Product name	
Reporting	Excellent
Diagnostics	Good
Tune-up	Fair
Cleanup	Poor

To excel in **reporting**, a product must provide a comprehensive and accurate accounting of the resources being used in your PC. Better products pay attention to items such as graphics board memory and SCSI IDs—items beyond those covered by the Windows 95 Device Manager.

For **diagnostics** we expected a product to be able to pinpoint a variety of problems in the memory, hard disk, and video subsystems. Better products also probe the PCI bus, CD-ROM drive I/O, and sound card performance. The ability to script and save a test to perform on several PCs was a plus.

To score well in **tune-up**, a product must deliver accurate advice relevant to settings in the Windows 95 Registry that would optimize performance. Better products clearly explain why changes would enhance performance and offer to make the changes for you if you choose.

As applications have become more complex, the **cleanup** functions that these packages offer have become more important. Better products can uninstall unwanted applications, root out duplicate files and leftover .TMP files, and locate missing or orphaned DLLs. Clear explanations of why the program thinks you should remove particular files are a must.

extensive. Only Quarterdeck's WINProbe 4 (also reviewed here) is as thorough on this data.

QAPlus has a complete set of diagnostics including basic motherboard, graphics board, RAM, port, and disk tests. It also includes printer and mouse tests. But unlike with AMI's PC Care 95, the tests cannot be written into scripts for quick execution on multiple PCs. Alone among the five programs in this roundup, QAPlus sometimes crashed on our test systems during diagnostic tests.

QAPlus's interface was often ungainly. Many of its icons bring up panels that are modal; this prevents you from accessing help, which is on the menu in the main panel. One nice touch is DiagSoft's Electronic Technical Support Center (ETSC), which runs a quick set of diagnostics and phones DiagSoft's tech-support e-mail system. Simply leave a message (with the attached report) and technicians will be able to respond on the basis of detailed information.

Still, QAPlus is not the best of its breed. It faces stiff competition from PC Care on diagnosis and from WinCheckIt on reporting.

QAPlus/Win-Win. Estimated street price: $65. DiagSoft Inc., Scotts Valley, CA; 800-342-4763, 408-438-8247; fax, 408-438-7113; http://www.diagsoft.com. *Circle 475 on reader service card.*

TOUCHSTONE SOFTWARE CORP.

WinCheckIt

TouchStone Software Corp.'s CheckIt utility has long been the most accurate reporting software around, and the Windows 95-compatible WinCheckIt 4.0 ($50 street) continues that streak. With accurate IRQ and DMA reporting available from Windows itself, many users won't need WinCheckIt's more thorough module. But if it is your job to probe the PCs of others, WinCheckIt should be in your toolbox. The product also delivers diagnostic and cleanup features, though these are not as robust as its reporting functions.

SUITABILITY TO TASK	
WinCheckIt	
Reporting	Good
Diagnostics	Good
Tune-up	N/A
Cleanup	Good

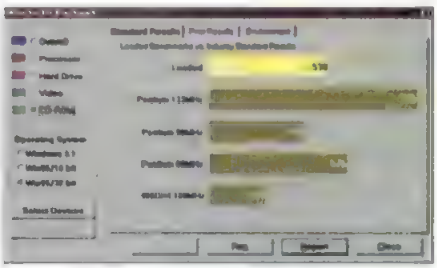
N/A—Not applicable. The product does not perform this task.

On all four of our test machines, WinCheckIt correctly identified all the IRQs in use and not in use. It did miss one DMA channel missed by all the programs (and presumably masked by Windows), but it was the only program that correctly found the DMA channels used by our Ensonique sound card. In fact, the only reporting error it made across the four machines was an incorrectly identified UART on a serial port that had a mouse attached to it. Unfortunately, WinCheckIt lacks the more advanced reporting features for such items as the PCI bus or SCSI ID information.

The product's diagnosis capabilities aren't as extensive as those of class leader, PC Care 95 (though basics such as RAM, motherboard, and I/O tests are offered), nor is there any kind of scripting available. TouchStone's CheckIt Diagnostic Kit, Version 4, a specialized product with advanced diagnostics (including scripting), is planned for release soon.

WinCheckIt doesn't offer tune-up advice, but it does include two cleanup programs. One, an uninstall program, has the convenient ability to find orphaned shortcuts: desktop or Start Menu items that point towards nonexistent executables. The second cleanup module, called Clean and Zip, does a good job of identifying all kinds of garbage that can build up on your hard disk—empty directories, .TMP files, duplicate files, and so on. A couple of oversights: The utility doesn't tell you why it has prompted you to prune a particular file on the cleanup list, and it makes decisions about duplicates solely on the basis of filenames without regard to file size.

As a bonus, TouchStone includes a CD with complete reference books on Windows and DOS. WinCheckIt deserves kudos for the accuracy of its reporting. Its other modules, while useful, could benefit from the thoroughness that went into its reporting module.



WinCheckIt includes benchmark test comparisons to gauge your PC's performance.

WinCheckIt. Estimated street price: $50. TouchStone Software Corp., Huntington Beach, CA; 800-531-0450, 714-969-7746; fax, 714-960-1886. *Circle 476 on reader service card.*

QUARTERDECK SOFTWARE CORP.

WINProbe 4

Quarterdeck Software's WINProbe 4 ($50 street) is a jack-of-all-trades. Unfortunately, as in the old adage, it is master of none. It delivers system reporting, di-

Diagnostic Utilities

■ YES ☐ NO

Products listed in alphabetical order	First Aid 95	PC Care 95	QAPlus/ Win-Win	WinCheckIt	WINProbe 4
Street price	$50	$40	$65	$50	$50
Certified Windows 95–compatible	■				
Registers in Windows 95 Uninstall List	■	■		■	
Self-uninstall option	■	■		■	
Reporting					
Reports on IRQs and DMAs		■	■	■	■
Reports on graphics board RAM		■	■		
Reports on serial UART		■		■	■
Diagnostics					
Executes performance comparisons		■		■	
Tests for bad RAM		■	■	■	■
Performs disk surface test		■	■	■	■
Tune-Up, Cleanup, Troubleshooting					
Checks and tunes system files	■	■			
Checks and tunes Registry settings	■				
Uninstalls other programs	■	■		■	
Finds duplicate files	■	■		■	
Identifies orphan DLLs	■	■			
Locates missing DLLs	■				

agnostics, some tuning advice, and cleanup help in the form of a duplicate file finder but doesn't excel at any of these tasks.

The reporting module is fairly thorough, covering even serial UARTs left out by others. But on our test systems, WINProbe's reports contained quite a few errors. On our most complex machine, it missed three IRQs: the second of the two IRQs taken by the sound card, the PS/2-style mouse IRQ, and the one taken by the network card. On another machine, it again missed three IRQs, including one taken by a SCSI controller. It also missed the DMA channels takenby the sound cards. In its favor, itsCOM port diagnosis was able to identify the UARTs even on the port that had the mouse attached to it, which most other programs missed.

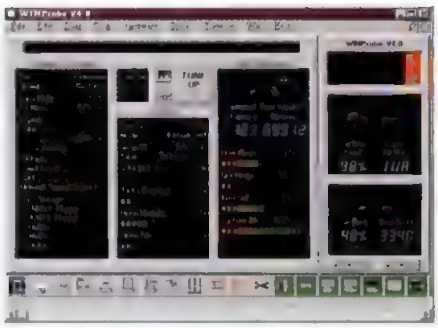
SUITABILITY TO TASK	
WINProbe 4	
Reporting	Fair
Diagnostics	Good
Tune-up	Fair
Cleanup	N/A

N/A—Not applicable. The product does not perform this task.

The diagnostic modules include the basics: tests for bad RAM, disk surface tests, I/O checks, video tests, and so on. One standout was the sound card test, which lets you check whether stereo sound is working properly.

WINProbe comes with a lackluster tune-up module that's essentially a set of panels with Polonius-like advice (remove unused fonts, remove mouse drivers from CONFIG.SYS since Windows 95 includes a built-in mouse driver, and so on), with no links to allow automated implementation of that advice. Most of the advice is sound, although there are a few minor errors and one absolute whopper: It advises you to delete WINHELP.EXE and the Windows help files, but WINHELP.EXE is used to provide the help engine for *all* Windows applications, not just for Windows.

A few of WINProbe's user interface features are novel and notable. A push-pin icon toggles the reporting panel to a thin strip that monitors resource usage, cache usage, and CPU usage in real time. Another icon lets you save a report to a separate window so that you can see several reports at once. Bundled with the product is a bonus CD that includes Quarterdeck's Web Browser and Version 1.0 of Clean Sweep.



WINProbe 4's main screen packs a lot of information.

WINProbe has several nice touches, but compared with others, its functions are middle-of-the-pack.□

WINProbe 4. Estimated street price: $50. Quarterdeck Software Corp., Marina Del Rey, CA; 800-683-6696, 310-309-3700; fax, 813-532-4222; http://www.checkit.com. *Circle 477 on reader service card.*

MOVING?

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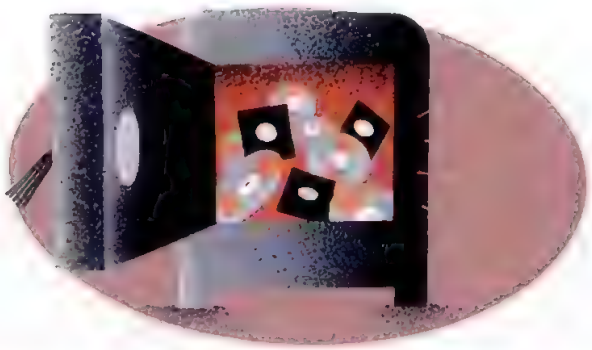

NETWORK BACKUP UTILITIES

YOUR NETWARE SERVER IS BETTER PROTECTED THAN EVER. TODAY'S NETWORK BACKUP PACKAGES ARE RELIABLE AND FAST.

By Steve Rigney

You know that sinking feeling. It's 9:00 a.m., and you can't log on to the server. Finally, when you can, you manage to pull down the draft of that important report, the one you penned with the utmost care the evening before. Your boss is expecting it today. But instead of seeing your lovely file for a quick read-through before you submit it, all you see is a jumble of unrelated characters. Your LAN administrator comes to your rescue with a network backup package, but the struggle doesn't necessarily end there. Restoring your corrupted files can take longer than creating them did in the first place. All you can do is sit and wait—and wonder why things like this still happen.

Before the memory of such special moments drives you to nail-biting, take heart. The all-too-familiar process of trying to restore a file is turning from a nightmare into, well, at least only a semi-bad dream. The newest versions of network backup tools offers unprecedented reliability and ease of use. Some allow interoperability across a variety of NOSs, backup media, and even other backup packages.

In this roundup, we review network backup packages for servers running NetWare. Although many network administrators run a combination of NOSs these days and many are setting up Microsoft Windows NT Servers, NetWare continues to drive the lion's share of installed networks. And there are more third-party utilities available for it than for its competitors. Here we'll look at Cheyenne's ARCserve, Arcada's Backup Exec, Stac's Replica, and Seagate Storage Manager.

Each of these products carries a unique set of features, but the one thing you can count on is that they all come through when it matters: Each completes the most important tasks—network backup and restore—without problems.

SETTING SAIL

How should you go about choosing the correct NetWare backup product for your site? There are several factors to consider.

First, ask yourself how easy the package must be to install and manage. Each of the products reviewed here relies on a Windows-based administration utility and a series of NLMs (NetWare Loadable Modules). Useful Windows administration tools are essential, since any time you load new NLMs onto your servers you are risking conflicts. The Windows utilities are usually more intuitive than NetWare's System Console and also let you manage

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multiple servers from a single location.

NLMs—the second element in backup programs—communicate between the administration program and your backup media. They come with their own set of issues. NLMs depend on other specific NLMs. If you don't have the versions you need installed, everything can break down.

In turn, most backup utilities require specific versions of common NLMs, such as CLIB and Btrieve, and will not load if you have the wrong version running on your server. Look for a backup program that addresses this issue. We were impressed that ARCserve, our Editors' Choice, not only ships with all of the proper versions of the NLMs but also includes an intelligent loader that walks you through loading the modules and warns you if a version is wrong anywhere.

Another challenge you may encounter while installing NLM-based utilities is loading them in the right order: If you get the order wrong, your package won't work. ARC-serve, Backup Exec, and Storage Manager include NetWare Configuration Files (NCFs) that help you keep all of the necessary files in their correct order when you want to run a backup. Replica's solution is somewhat more primitive: It makes changes to your existing AUTOEXECUTE.NCF but does not supply a new file specifically for backup purposes.

Once you have everything installed, how hard is it to start using the product? A friendly interface is crucial—unless you enjoy spending several weeks learning features. The backup products we reviewed range in complexity, but each offers a fairly intuitive interface.

Backup Exec and Replica were the easiest to use, though ARCserve and Storage Manager offer better options: strong report generation, tape management, and notification. They complement this extended functionality with superior on-line help.

SPANNING THE NETWORK

The second major quality you should seek in a backup package is flexibility. Most administrators don't keep all of their important data on a single NetWare file server but spread it across multiple servers running different NOSs.

To back up heterogeneous networks you need client agents, small pieces of software similar to TSRs. The client agents handle communications with the server. Fortunately, for the most part, the products in this roundup let you back up both NetWare 3.*x* and 4.*x* servers, clients running Windows 3.*x*, Windows 95, Windows NT, OS/2, and some flavors of Unix, plus your Macs. All four work with both NDS and the Bindery on your NetWare servers.

It's not just about operating systems, though: You might have multiple storage-management products on the same LAN. For example, you might use ARCserve to back up your NetWare servers and Backup Exec to back up your Windows NT

ARCserve 6.0 for NetWare

This was not an easy decision—a couple of these packages are veterans that have continually been improved. We finally gave the nod to Cheyenne's ARCserve for NetWare. A perennial leader in the network backup market, Cheyenne continues to be an excellent choice.

Past all the basics of backup and restore, which ARCserve executes well, this package gives you an arsenal of helpful features and utilities. These tools help you make sure you're doing everything right.

ARCserve has a complete disaster-recovery routine, the Intelligent Loader, Cue Cards, and the Job Status Wizard.

We give an Honorable Mention to Arcada's Backup Exec for NetWare. Backup Exec has a remarkably easy installation and an excellent user interface. It also offers great flexibility in the number of clients it recognizes and its ability to read SIDF, MTF, and Cheyenne tape formats.

How to Read the Suitability to Task Boxes

You need your backup package to be easy to use, compatible with your network setup, and quick at its job. Our Suitability to Task ratings will help you determine how smooth your backup and restore operations can be.

SUITABILITY TO TASK	Product name
Installation and configuration	Poor
Management and administration	Excellent
Compatibility	Poor
Performance	Poor

Our **installation and configuration** task reflects how easily a product can be installed onto backup servers right out of the box. We consider documentation and client and server installation programs, and we note how easy it is to interface with an existing tape drive. Products are also judged by how complicated they are to fine-tune once installed.

Management and administration ratings are based on a product's logging and error reporting, its alert options, and its ability to recover from system and operator errors. Ratings also reflect how effectively backup monitoring tools provide real-time client and server backup status. We also look at each product's ability to locate and restore files and to perform disaster recovery.

To assess a product's **compatibility,** we looked at its ability to work with key components in an existing backup system. To earn an excellent rating, a product must be able to perform complete backups of data and system files for a number of client and server types. We also consider how well the backup software works with tapes generated on other backup systems.

Performance ratings refer to raw speed—the throughput at which the package completes its backup and restore functions. Products with excellent ratings do not take significant delays for setup. They also employ effective compression schemes to speed file transfer.

Performance Tests: Network Backup Utilities

Backup performance was generally uniform among these products, and the differences were not significant. The results on the Restore tests were more disparate, however—a finding that may be more important to network managers.

What the Numbers Mean

The backup times we recorded were comparable overall. Most administrators wouldn't be too concerned with the differences we found, which indicate discrepancies of 2 or 3 minutes during a 1GB backup.

On our Restore test, however, times were not uniform. The differences here are attributable to the products' restore engines. Some products, such as ARCserve, do lookups in a database on the server, which slows the process. Storage Manager goes a step further, also performing a preliminary hardware check.

Fortunately, these delay times do not increase when you perform larger file restore operations.

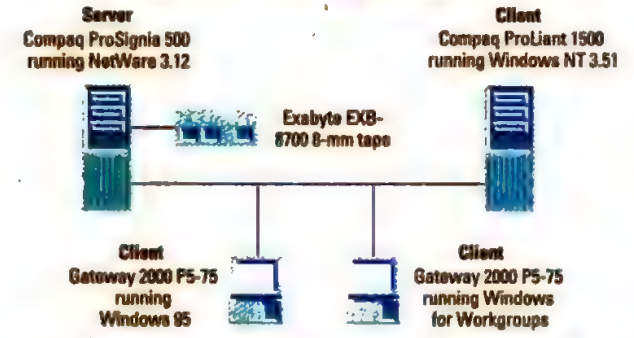
Our first set of tests were timed backups. We ran each product through the backup process at least three times, using both a stopwatch and the product's log to arrive at final numbers.

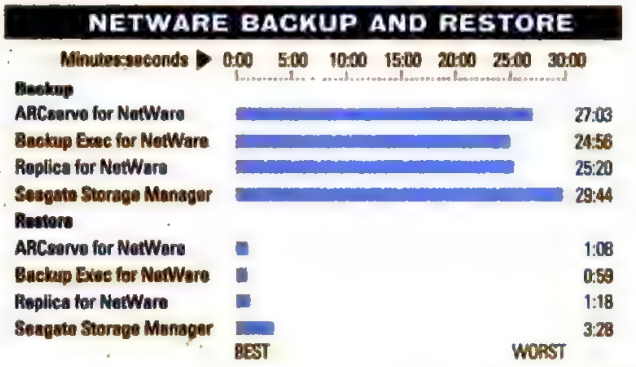
In order to avoid skewed measurements, we turned off all verification tasks and reset the server and the test PCs each time to flush any cache from memory. We also started each test from PCs running Windows 95, Windows for Workgroups, and Windows NT (where applicable) to make sure that the desktop OS played no part in the end result.

Some products, including Storage Manager, seemed to take several seconds before they even sent the job to the server. We included that delay in our reported times, thus considering all of the time it took each product to complete a backup. If we had looked only at the time it took for the tape to write or read the data, we would have been testing the tape hardware, not the storage application.

—Analysis written by Steve Rigney

Network Backup Test-Bed





How We Tested

We installed each of the products on a Compaq ProSignia 500 with 40MB of RAM, a 4GB hard disk, and NetWare 3.12. The two administration PCs (not shown) were Gateway 2000 P5-75 PCs with 16MB of RAM each and 850MB hard disks.

Two of the clients were Gateway 2000 P5-75 PCs running Windows 95 and Windows for Workgroups. The third was a Compaq ProLiant 1500 with 40MB of RAM and a 4GB hard disk running Windows NT Workstation 3.51. Our tape device was an Exabyte EXB-8700 8-mm DAT drive.

Our testing data set consisted of several types of data files—including Word, Excel, graphics, database, and text files—ranging from 100 bytes to 5MB. The total size of our data set was 978MB. For our Restore operations we selected three database files that totaled about 5MB.

servers. In this situation, the ability to trade tapes across platforms and OSs is a necessity. While all of the products except Replica offer some measure of cross-compatibility, Backup Exec offers the best integration with different tape formats.

We were generally impressed with the products' ability to work with multiple tape devices and SCSI adapters. What's more, all of the products offer some way to ease your backup and restore tasks, such as add-on kits that let you use your autoloader or fast digital linear tape (DLT) device. Storage Manager even includes automatic tape rotations and HSM.

But occasionally some of these "time-saving" features can prove confusing. For example, Replica will not allow you to back up a single subdirectory or file; you must replicate an entire volume at a time. Storage Manager lets you choose single files and directories for backup, but its engine can take up to 7 minutes to tag all the files in a single directory. We would like to see vendors offer a simple, fast way to create a customized, ad-hoc backup job.

These products are powerful life-saving tools, and it's been fun to watch them become easier to use. Read on to find out which ones best suit your needs.

CHEYENNE SOFTWARE INC.

ARCserve for NetWare

ALL REVIEWS BY STEVE RIGNEY

PC MAGAZINE EDITORS' CHOICE

This market leader for NetWare server backup is jam-packed with features and comes with a helpful 1,000-page manual. The docs weren't necessary for installation, but otherwise they'll serve you well with this multifaceted product.

ARCserve 6.0 for NetWare offers complete disaster recovery and includes the ability to read SIDF-compliant tapes, as well as any media created using another Cheyenne product. Its performance was in

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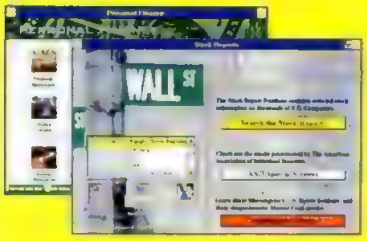

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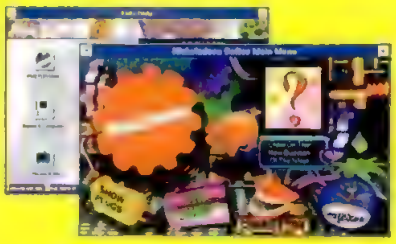

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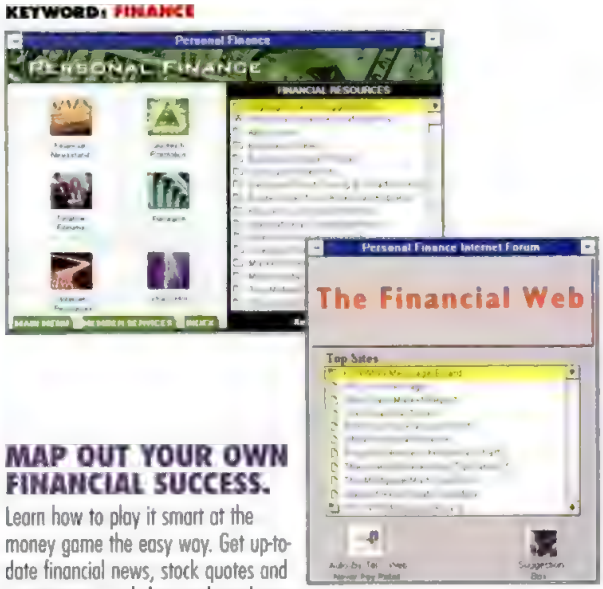

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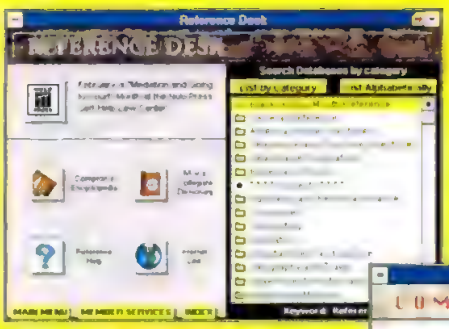
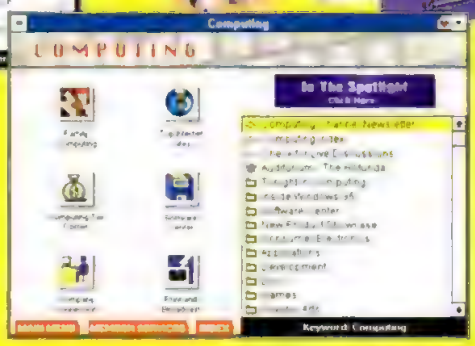


KEYWORD: REFERENCE



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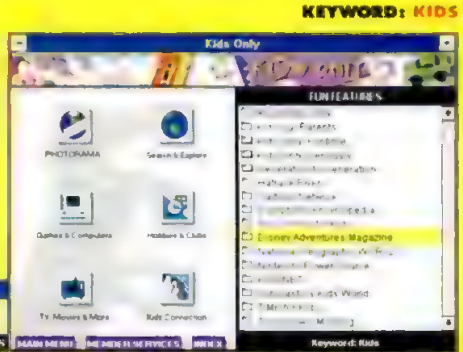

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Kennedy Maize, Newsbytes News Network, May 12, 1995

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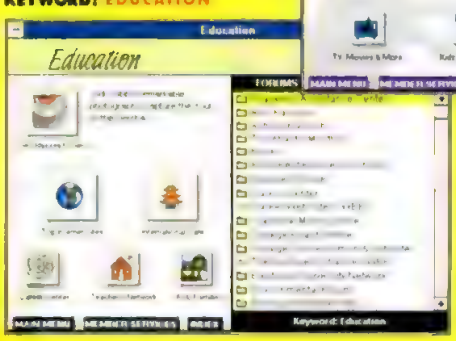

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Windows Magazine - 1995 Win 100 Awards

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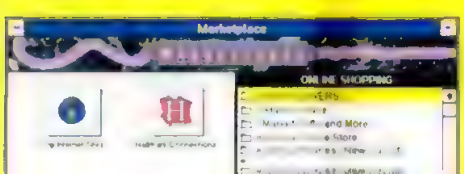
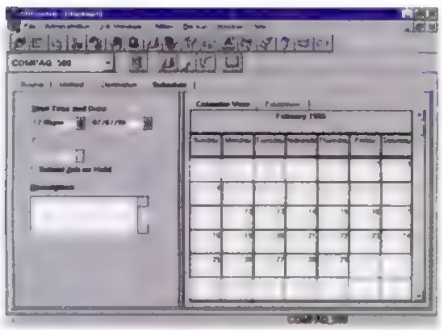




ARCserve helps you create scheduled backups and restores, and keep a history of events.

keeping with the leaders here. This complete approach to backup earned it our Editors' Choice.

Similar to Backup Exec and Storage Manager, ARCserve ($1,895 list) allows you to back up all of your client PCs running OS/2, DOS, Windows 3.*x*, Windows 95, NetWare 3.*x* and 4.*x*. Client agents for Windows NT and Macs are available for an additional $495 each. Agents for different flavors of Unix are also available, starting at $495.

SUITABILITY TO TASK

ARCserve for Netware

Installation and configuration	Excellent
Management and administration	Excellent
Compatibility	Good
Performance	Good

The software is easy to install and includes about 100 different SCSI drivers. We especially liked a feature called the Intelligent Loader, which alerts you if one of the NLMs didn't load and offers a possible explanation as to why.

ARCserve is even ready in case you encounter any problems while installing it or using its features. Its Cue Cards walk you through a job setup, while the Job Status Wizard gives more detailed error code explanations and monitors an event's history or status. None of the other products offered similar help utilities.

Like Replica, ARCserve includes a disaster-recovery process that enables you to revive a failed server and restore your data. The method consists of creating several disks that reload your NetWare server with the necessary ARCserve NLMs and initiate a data restore.

ARCserve's administrative tools help you create scheduled backups and restores, keep a history of events, and track the location of your tapes at all times.

ARCserve is one of the most powerful storage-management platforms on the market, and it was among the fastest performers in our testing. It has dozens of great utilities and features that you can explore as you need to, and all of them are easy to navigate and use.

ARCserve 6.0 for NetWare. List price: single server, $795; enterprise edition, $1,895; client agents for Windows NT and Macintoshes, $495 each; Unix client agents, $495 and up. Cheyenne Software Inc., Roslyn Heights, NY; 800-234-9462; http://www.chey.com. *Circle 469 on reader service card.*

ARCADA SOFTWARE INC.

Backup Exec for NetWare, Enterprise Edition

Need a backup utility that can handle different media formats? If the answer is yes, Backup Exec for NetWare is your choice. It reads SIDF and Cheyenne-formatted tapes, and reads and writes MTF tapes. (Fortunately, the most recent versions for NetWare and Windows NT also allow you to switch tapes between the OSs.) Backup Exec for NetWare 7.01 is a first-rate package with a good interface, easy install, and excellent performance.

ARCserve may offer more features, but Backup Exec's interface is simpler to learn. In fact, our only complaint with the interface is that you have to start multiple copies of the Backup Exec program if you want to perform multiple backup or restore jobs to different servers. Other packages, including ARCserve, allow you to launch multiple jobs as threads using a single session of the application.

Backup Exec lets you back up multiple client PCs running DOS, Windows 3.*x*, Windows 95, Windows NT, Unix, or OS/2, plus your Macs. The $1,395 enterprise version lets you back up an unlimited number of client PCs and NetWare 3.*x* and 4.*x* servers.

Similar to Storage Manager, Backup Exec requires you to perform part of its installation from the server console. You have to load several NLMs and know which type of SCSI adapter you are using for your tape device. Fortunately, the software ships on a CD-ROM, so you don't have to spend lots of time inserting diskettes. Although you can submit and monitor jobs directly from the system console, you probably should install the Windows-based Backup Exec manager. However, it is nice to be able to monitor and submit storage tasks directly from the server.

SUITABILITY TO TASK

Backup Exec for Netware

Installation and configuration	Excellent
Management and administration	Good
Compatibility	Excellent
Performance	Good

Backup Exec turned in the fastest results on our Backup performance tests, probably because of a complete rewrite of the engines for local and remote backups. Developers at Arcada say they did the rewrite expressly to improve performance. Backup Exec also does a good job

Network Backup Utilities

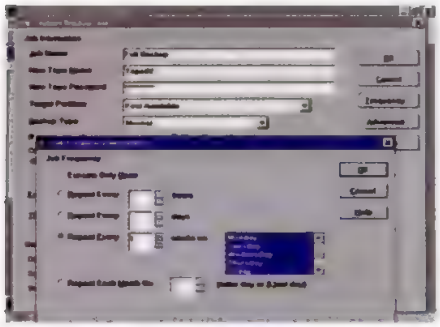
■ YES ▫ NO

Products listed in alphabetical order

	ARCserve 6.0 for NetWare	Backup Exec for NetWare 7.01b, Enterprise Edition	Replica for NetWare 2.0	Seagate Storage Manager 4.0, NetWare Edition
List price	Single server $795, Enterprise Edition, $1,895	Single server $695, Enterprise Edition, $1,395	Single server, $995	Single server 25 users, $995 unlimited users, $1,995 Multiserver (unlimited users), $3,595
Client backup				
Windows 3.*x*/Windows 95/Windows NT	■ ■	■ ■ ■	▫ ▫ ▫	■ ■ ■
OS/2, Macintosh, Unix	■ ▫ ▫	■ ■ ■	▫ ▫ ▫	■ ■ ■
Backs up client/server	■ ■	■ ■	▫ ■	■ ■
Backs up NetWare Bindery/NDS	■ ■	■ ■	■ ■	■ ■
Provides HSM	▫	▫	▫	■
Performs scheduled backups	■	■	■	■
Tape formats supported	SIDF	MTF, SIDF	Proprietary SIDF	SIDF
Provides built-in tape rotation	■	▫	▫	■
Optional autoloader support	$695	$595	$595	$795 and up

of providing you with detailed logs and reports and can send an e-mail to the system administrator if a job fails.

With great performance and flexibility, as well as good compatibility across many client and server platforms, Backup Exec for NetWare is a great backup solution.



With Backup Exec, you can back up many different platforms with the basic package.

Backup Exec for NetWare 7.01b, Enterprise Edition. List price: $1,395. Arcada Software Inc., Lake Mary, FL; 800-327-2732; http://www.arcada.com. *Circle 470 on reader service card.*

STAC INC.

Replica for NetWare

This network backup package marches to the beat of a different drummer. Although Replica for NetWare 2.0 doesn't provide all the features that the other products in this network roundup do, it does offer a unique approach to protecting NetWare file servers that will appeal to some network managers.

The standard approach for backing up servers, used for years by the other products here, is to copy data file by file to a backup device, storing it in one of several tape formats; you then rely on the vendor's proprietary program to copy it back to your disk. Replica, instead, copies your NetWare volume object by object to a tape device or another NetWare volume or server, and you can use a DOS or Windows application to access the data.

SUITABILITY TO TASK

Replica for Netware

Installation and configuration	Excellent
Management and administration	Fair
Compatibility	Poor
Performance	Good

It has some limitations. At present you can back up only NetWare 3.12 and 4.*x* file servers—no other NOS or client platforms. It has some basic utilities for reporting and scheduling unattended jobs, but that's it. You can't track tapes or use an automatic tape-rotation scheme.

On the other hand, Replica was the easiest product to install and use. All you do is load a handful of NLMs and a simple Windows-based application that lets you choose the server you want to replicate and where you want to send the data.

One of our favorite Replica features is its method for disaster recovery. Using two diskettes that you create with Replica, you can revive a downed server. For just a file or directory restore, you can use a DOS or Windows app to access or copy the replicated data. We were able to recover data from a failed hard disk in under 10 minutes. You don't even have to run the Windows-based utility to find your tape and mount the volume: You can perform these tasks from the server console.

Since Replica writes objects, not files, to the media, it isn't currently compatible with any media formats on the market. You cannot swap media with any other storage products. The developers at Stac are trying to have their tape format incorporated into the SIDF standard, but currently only the proprietary media is available.

The ability to mount a backup tape as a NetWare volume and use any application to access it is refreshing. Replica is also fast. When Stac adds drivers for more platforms and increases the product's management capabilities, it will be a powerful storage-management solution.

Replica for NetWare 2.0. List price: single server, $995. Stac Inc., San Diego, CA; 800-522-7822; http://www.stac.com. *Circle 471 on reader service card.*

SEAGATE SOFTWARE,
STORAGE MANAGEMENT GROUP

Seagate Storage Manager, NetWare Edition

If *more* is what you want, check out Seagate Storage Manager 4.0, NetWare Edition (formerly from Palindrome). It offers more network storage utilities than the other reviewed products. Storage Manager is a first-rate package, but it can be overwhelming, and its performance on our tests was down compared with the other packages.

For $1,995 you get full backup and restore for your NetWare 3.*x* and 4.*x* file servers, hierarchical storage management, data archiving, and the ability to back up all your PCs running any variety of Windows, DOS, OS/2, and Unix, plus your Macs. Storage Manager also includes powerful tape-rotation schemes and a fairly intuitive interface. But, for example, it should be easier to back up individual files or subdirectories.

In addition, installing and configuring Storage Manager was not as easy as with other products in this review. You have to install and load a series of NLMs on your NetWare file server and then install the management and configuration utility on a Windows-based client. On our test, we decided to use a client running Windows 95 as the management station and NetWare 3.12 on our server. Yet, we still had to download and install the NDS client drivers on the management console, even though we didn't need them unless we were going to upgrade our servers to NetWare 4.1.

SUITABILITY TO TASK

Seagate Storage Manager

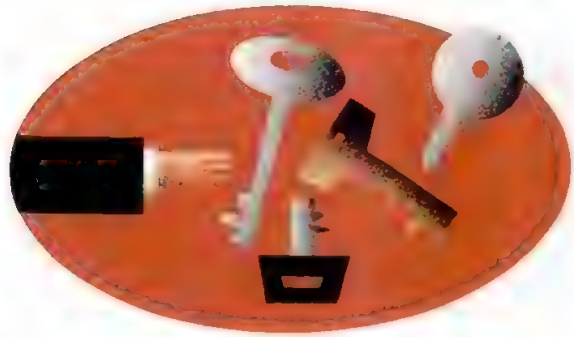
Installation and configuration	Good
Management and administration	Good
Compatibility	Good
Performance	Fair

Storage Manager offers both the grandfather, father, son and the Tower of Hanoi rotation schemes to guarantee that all of your data is stored in several locations at once. But the package seems to rely too heavily on these schemes. That is, it's hard to create a custom backup job. You must disable the tape rotation and use the File Manager utility to select each file you want to back up. There is no easy way to tag the files in a NetWare volume or subdirectory.

The Storage Manager user interface is good but requires some time to master. It has some good built-in scheduling options: unattended backup, archive, and after-hours data migration. Storage Manager also offers powerful reports for keeping track of all of your storage jobs.

No other product in this review has the tape-rotation features that Storage Manager does. Its performance was not in keeping with the other packages here, though, and we would like to see the next release offer better flexibility for creating customized jobs. □

Seagate Storage Manager 4.0, NetWare Edition. List price: single server, $1,995; multiple servers, $3,595. Seagate Software Storage Management Group, Naperville, IL; 800-288-4912; http://www.palindrome.com. *Circle 472 on reader service card.*



MORE ESSENTIAL PROBLEM SOLVERS

CALL THEM ESOTERIC, CALL THEM NICHE-MARKET, BUT THE TOOLS WE'VE PROFILED HERE TACKLE A BROAD RANGE OF SYSTEM AND PERFORMANCE ISSUES.

By David Haskin

If you want to pinpoint Windows 95's greatest shortcomings, look for the utility categories with the largest number of products. For example, computer viruses will probably always infect our PCs, and Windows 95 offers little or no help finding and removing them. As a result, third-party antivirus products abound. Similarly, while the new operating system's desktop is clearly superior to Windows 3.1's, a large number of new or updated desktop enhancers are trying to fill Windows 95's more noticeable gaps.

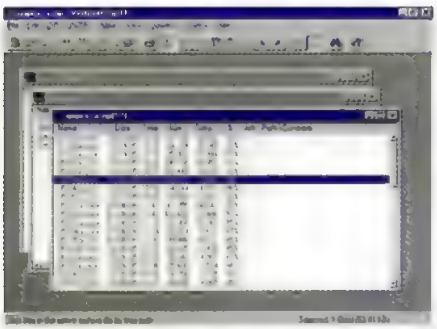
Other sections of this roundup feature the more crowded utility categories. But many useful and popular utilities for Windows 95 are not easily pigeonholed into specific categories. A summary of some of the best—or at least the most distinctive—of the uncategorizable utilities follows.

If you are a chronic downloader, often trade large files with coworkers and friends, or are simply seeking some way to clear some of the file clutter on your hard disk (without discarding it all), you need a file compression/decompression utility. Such utilities can create new .ZIP files, open existing ones, and help you track the ones you have. They even let you add and subtract files from zipped archives.

Zip-It 3.0 ($69.95), from Vertisoft Systems Inc. (800-466-5875, 803-295-5875), lets you use any of nine different compression algorithms; each offers a different trade-off between compression size and speed. It can create .ZIP files that span multiple disks and self-extracting files that you can expand without the use of a compression program. It also can test the integrity of compressed files and require passwords to alter or uncompress them.

Handily, Zip-It adds a compression option to the pop-up menu that appears when you right-click a file name in the Windows Explorer or in a Windows application's Save As and Open dialog boxes. You can search for filenames within compressed volumes and run programs without first decompressing them.

Zip-It supports Windows 3.1 and Windows 95, making it particularly useful in mixed environments. While it fully supports Windows 95 tricks like long filenames, its interface could use an update. For example, it has no dialog boxes that pop up with right mouse clicks, and its common dialog boxes resemble those in 16-bit applications. Also, wizards would be useful to walk you through the process of compressing and uncompressing files. As it is, you must wade through a series of



Zip-It is a powerful, flexible tool for creating and viewing compressed files.

dialog boxes to perform common functions like creating new .ZIPs.

PKZIP for Windows ($49), from PKWARE (414-354-8699), doesn't yet support long filenames, which is a significant inconvenience for Windows 95 users. A 32-bit version is expected in late summer.

This program, however, is still far easier to use than the classic PKZIP utility, which featured arcane command line switches that have bedeviled PC users for years. That frustrating complexity has been replaced with a typical Windows interface for creating and decompressing zipped files. First you name the compressed file, then you select the files to add to it. You can add files from multiple directories, although this part of the interface is convoluted; you must call a second dialog box from the first dialog to do this.

After you create compressed files or obtain them from other sources, you can view their contents. You can sort the file list, add or subtract files from it, and launch individual compressed files without uncompressing them first.

Compared with the other products, PKZIP for Windows has relatively few bells and whistles. It can't, for example, check the integrity of compressed files. There are no right-mouse-click options, and it provides only five different levels of compression.

WinZip 6.0 ($29), from Nico Mak Computing (800-242-4775, 860-429-3539), solves several of these problems. Most notably, it provides a wizard for unzipping files, which makes it ideal for computing neophytes.

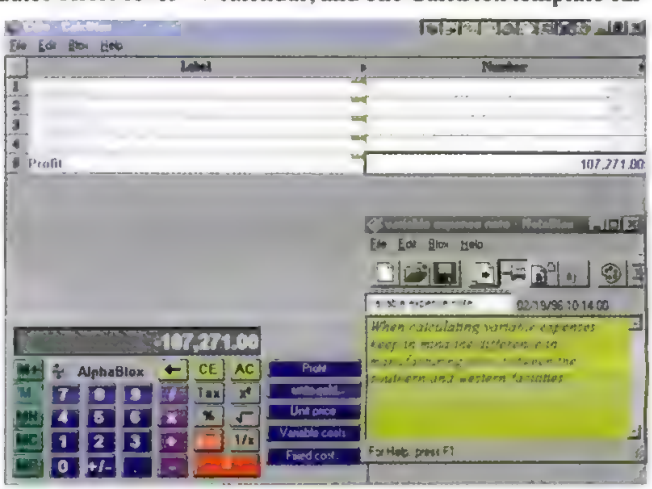
WinZip has the strongest Windows 95 look and feel of these three products and is the easiest to use. Like Zip-It, WinZip can build its compression capabilities into pop-up menus in the Windows 95 Explorer. However, unlike Zip-It's Windows 3.1–like dialog boxes, WinZip's dialog boxes and other interface elements look as if they were built for Windows 95. As with Zip-It, you can compress data files with long names and keep those names intact. You also can give your .ZIP files long names.

You can view the contents of compressed files or you can check out individual files, or uncompress them to specified directories. Like PKZIP, it offers five types of compression, compared with Zip-It's nine. You also can check the integrity of .ZIP files, and create self-extracting compressed files and .ZIP files that span multiple floppy disks.

All three programs delivered about the same compression performance. We compressed 13 bitmapped images that required just over a megabyte uncompressed. Using the software's tightest compression options, PKZIP did the best, creating a 314K .ZIP file. WinZip created a 315K .ZIP file, and Zip-It required 322K.

OfficeBlox 1.0 ($69.95), from AlphaBlox U.S. (800-451-1018, 617-229-2924), falls even further into the uncategorizable group. Nevertheless, this handy interconnected set of utility modules offers several excellent application enhancers.

OfficeBlox consists of four named application modules. ListBlox is a datasheet-like utility for creating text lists, NoteBlox creates freeform notes that resemble on-screen sticky notes, and CalcBlox is a combination spreadsheet and calculator. These mini-applications are useful but hardly unique. What makes this utility collection powerful is its fourth module, ToolBlox, and its use of OLE 2.0. ToolBlox is a toolbar that lets you launch each Blox module as a standalone application by double-clicking its icon. You can customize ToolBlox by adding icons for launching any application you want.



OfficeBlox's modules include CalcBlox, a combination calculator and spreadsheet, and NoteBlox, designed to create Post-it type notes.

More interestingly, though, you can add a Blox object by dragging its icon from ToolBlox to your desktop or to any application that can serve as an OLE 2 container. Double-clicking on an object embedded in an application launches the OLE edit-in-place capabilities; the container application's menus and toolbar change to those of the Blox object. This enables you to embed a NoteBlox object that explains a specific calculation in your spreadsheet. Or you can keep a Blox object on your desktop, a good spot for to-do lists and other items you reference regularly. You can even embed one Blox object within another, such as a NoteBlox item that provides details about a specific task in a ListBlox to-do list.

Though none of the Blox modules will replace more full-featured products such as spreadsheets and word processors, they have a reasonable amount of power and load quickly. NoteBlox features find-and-replace capabilities and time and date stamps. ListBlox includes sorting capabilities and ODBC-compliance for easily importing external databases. And each Blox application comes with dozens of templates for specific tasks: For example, one ListBlox template serves as a weekly calendar, and one CalcBlox template calculates a return on investment.

ClickFlick 1.5 (49.95), from MiraTech Corp. (800-330-9816, 415-842-7133), acts as a cross between a desktop enhancer and a macro utility. If you click your right mouse button while holding down some combination of the Alt, Ctrl, or Shift keys,

a customizable toolbar called a PopBox appears. Each PopBox has icons for launching often-used functions.

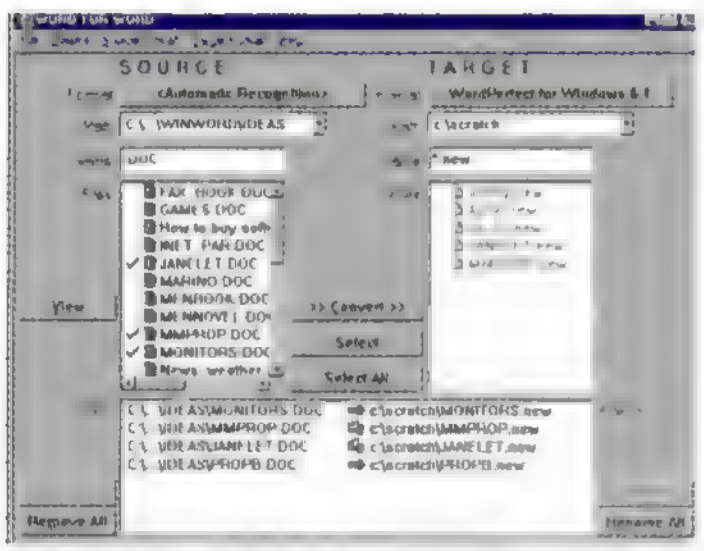
PopBoxes are context-sensitive. If, say, you're working in Microsoft Word for Windows, you can summon PopBoxes dedicated to specific functions like formatting. You can also nest PopBox icons: Clicking on the justification icon in Word for Windows' formatting PopBox leads to other icons for left, center, and right justification. ClickFlick comes with PopBoxes for many popular applications, and you can also create your own.

ClickFlick displays application-specific toolbars for fast access to common functions.

ClickFlick desperately needs wizards to simplify the roll-your-own customization process. Besides the clumsy configuration process, we also found a few pre-created ClickFlick buttons that didn't work as advertised on our test system. The center alignment button in Word for Windows, for example, just highlighted a selection.

Even so, once you finally set up ClickFlick to work the way you want, it can make your computing life a lot easier and faster. By the time you read this, MiraTech should have released a new version of ClickFlick that includes a batch language.

Word for Word 7.2, the granddaddy of file conversion utilities, is now part of the Adobe File Utilities 1.0 ($149) which should be shipping from Adobe Systems (800-624-6107, 415-961-4400) by the time you read this. This collection of utilities will also include Viewer95 (a file viewer utility formerly from MasterSoft), and DocuComp, which compares two versions of a document.



Word for Word can convert among 250 file formats, but its interface is confusing.

This latest version of Word for Word includes most of the file conversions added to the program through the years: It converts 250 formats, including 30 graphics file formats. If you want to convert a Peach Text document to Navy DIF, this program will fulfill your needs. It also converts more common PC and Macintosh formats.

Word for Word's conversion process is fast, but not as intuitive as it could be. After selecting the files you want to convert in one window, filenames then confusingly appear in two other windows. One window displays the file name of the converted file and the other simply lists all the conversions from which you can choose. The remaining steps for converting documents aren't exactly intuitive; the overcrowded interface, which remains largely unchanged from previous versions, needs an overhaul.

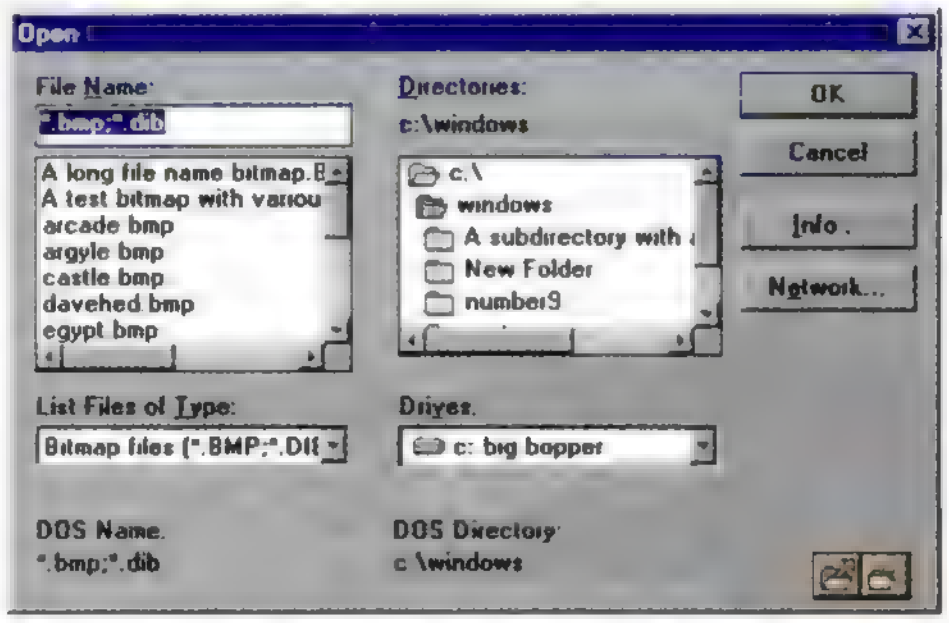
Word for Word does, however, offer some handy convenience features. You can view a file before the conversion and you needn't select the file format of the original document, as Word for Word automatically detects the format. We found the conversions generally accurate but not always flawless. For example, text and heading and footer styles in Word for Windows documents translated perfectly into Ami Pro and WordPerfect for Windows. When translating to Ami Pro, one paragraph style that originally had double spacing between paragraphs converted incorrectly to single spacing.

Word for Word doesn't provide detailed control over image format conversions such as color correction. For that, graphics aficionados must either use an image editor after the conversion or a product that specializes in graphics conversions, such as **HiJaak 95** ($49.95), from Quarterdeck (800-683-6696, 310-309-3700). Even after all these years, though, Word for Word still comes through with lots of reliable format conversions.

Speaking of conversion, if you converted to Windows 95 but still use Windows 3.1 applications, you can't benefit from the new operating system's support for file names as long as 255 characters unless you use either **Long File Names 4.0** ($49.95), from VIEW Software (800-487-8439, 415-856-8439), or **Name-It 1.0** ($59.95), from Vertisoft Systems (800-466-5875, 803-295-5875).

These programs take different approaches to retrofitting Windows 3.1 applications with support for long file names. A 16-bit application, Long File Names works in both Windows 3.1 and Windows 95. Though it's transparent and flexible, it's also somewhat clumsy.

After installation, Long File Names alters a 16-bit application's Save As and Open dialog boxes so you can type and view long filenames. Then it stores those long filenames in its own internal database. On the one hand, this makes Long File Names simple to use because it merely alters existing dialog boxes. However, this approach also means that it takes a moment for the dialog box to appear, while Long File Names refers to its own database of names. By contrast, Name-It uses Windows 95's native VFAT for its file name listings.



Long File Names retrofits existing 16-bit dialog boxes to display long filenames.

Also, you may have trouble reading Long File Names' altered dialog boxes. Because dialog boxes in Windows 3.1 applications aren't designed to display long file names, Long File Names adds a horizontal scroll bar to the filename field.

Some may find a scroll bar annoying to use for viewing long filenames. Even

though Long File Names supports names as long as 255 characters, only the first 24 or so of those characters can appear in the dialog box at the same time; then you must use the scroll bar. On the plus side, Long File Names adds two new buttons to the old Open, Save, and Save As dialog boxes. One button launches Windows 95 Explorer or Windows 3.1 File Manager, and the other lets you create new folders or subfolders with long names.

Name-It is a 32-bit application that only works in Windows 95. If a 16-bit program uses common dialog boxes, Name-It automatically displays its own Save, Save As, or Open dialog box, which closely resemble those in most Windows 95 applications. If a program doesn't use common dialog boxes, Name-It adds a button to the existing dialog that leads to its own. This approach provides a more consistent look and feel with other 32-bit applications than Long File Names.

After Dark provides extensive control over your screen blanker.

Despite their differences, both programs worked well in our tests. They not only create and read long file names, but they also display long filenames you create using 32-bit programs. Neither program is a total solution. Because they only work with Save, Save As, and Open dialog boxes, they can't help a DOS or Windows 3.1 compression utility compress files and keep long file names intact.

While Windows 95 print capabilities are superior to those in Windows 3.1, color printing remains a slow process. **ColorFast** ($89.95), from LaserTools Corp. (510-420-1319), tries to rectify that problem for color ink jet printers by providing its own print drivers.

ColorFast provides replacement drivers for your color ink jet printers that include color correction capabilities.

ColorFast's results vary depending on your printer, the item you're printing, and the application from which you're printing. For example, with a HP DeskJet 660C and the standard driver obtained from HP, one page color flow chart created by in CorelFlow took 2 minutes 42 seconds to print; ColorFast needed 2 minutes 51 seconds. Printing a 150K photograph saved in JPEG format (using Microsoft Explorer) took 2 minutes 50 seconds for both ColorFast and the normal HP driver, and a gray-scale page from a Microsoft PowerPoint presentation needed 4 minutes 23 seconds with both drivers.

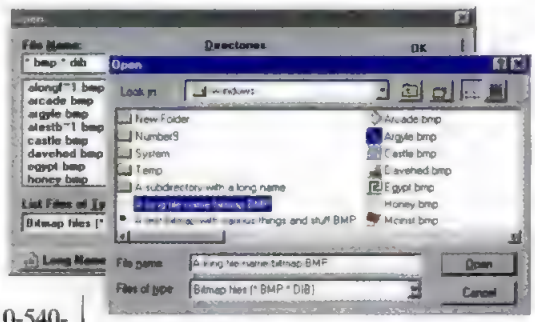
When it printed a color PowerPoint slide, however, ColorFast bettered its time. The standard driver required 4 minutes 11 seconds, while ColorFast required just 3 minutes 40 seconds. Also, when we used the older driver that came with Windows 95 for the similar HP 560C, ColorFast printed 10 to 30 percent faster for all tasks. LaserTools claims that such speed improvements are the norm.

Besides attempting to speed color printing, ColorFast provides simple controls over the printer's output of color and halftones. But because LaserTools designed ColorFast for nonartists, it doesn't substitute for true color calibration that matches screen colors to printer output.

Let's face it: Nobody will ever call **After Dark for Windows 95** ($30), from Berkeley Systems (510-540-5535), an essential utility. Even though Windows 95 comes with some decent screen savers, After Dark remains the gold standard for screen savers, and arguably the most fun. This version has 45 enjoyable screen savers—15 more than before—that range from the classic Flying Toasters to Flying Toilets and Boris the Cat.

Besides adding Windows 95 compatibility and new screen savers, relatively little has changed in this upgrade. The After Dark control panel still enables you to configure the screen savers and determine, for example, whether they should include sound effects and how many elements (toasters, for example) should appear on-screen. Also as before, After Dark includes a handful of other useful capabilities. Most notably, its Eco-Logic feature enables you to use your monitor's power-down capabilities even if your video adapter doesn't support that feature.

While After Dark works reasonably well with Windows 95, there's still room for improvement. You still must load it from your Startup folder or from the LOAD= line in your WIN.INI file, which requires system resources and clutters your Taskbar. A proposed solution: Berkeley should simply build After Dark into the Screen Saver tab of Windows 95's Display Properties dialog box. □



Name-It provides Windows 95–style dialog boxes in Windows 3.1 applications.

OS/2 UTILITIES

FOR ALL THAT SETS OS/2 WARP APART FROM WINDOWS 95, ITS UTILITY NEEDS ARE QUITE SIMILAR. OS/2'S OBJECT-BASED DESKTOP, BACKUP, AND MEMORY ARE ALL PRIME UTILITY TARGETS.

By Esther Schindler

There is a popular myth that contends that few mainstream OS/2 applications—let alone utilities—are available. Attempting to describe the top OS/2 utilities in the allocated space quickly disproves that theory. As with every other operating system, OS/2 offers an abundance of utilities that enhance or tune systems running OS/2. But no operating system is perfect; accordingly, several companies have written indispensable utilities to smooth away the rough edges and fill the gaps in OS/2.

DESKTOP ENHANCEMENTS

Object Desktop ($89.95), from Stardock Systems (313-453-0328), is a collection of Workplace Shell improvements. Some of Object Desktop's features make the desktop more attractive, but the program is more than just a pretty face.

Object Desktop replaces OS/2 Warp's launchpad with a more efficient Tab launchpad, which takes up less screen space. A Control Center gives you virtual desktops, easy access to oft-used desktop objects, and niceties like a digital clock and CPU monitor. Archived files appear as desktop folders; Object Desktop unzips them and lets you view zipped files on the fly. Even better, you can launch programs from within .ZIP files and treat anything in a .ZIP file as an ordinary desktop object. The program also includes a superb file navigator, folder caching, a better text editor, one-click close, and dozens more features, both minor and major.

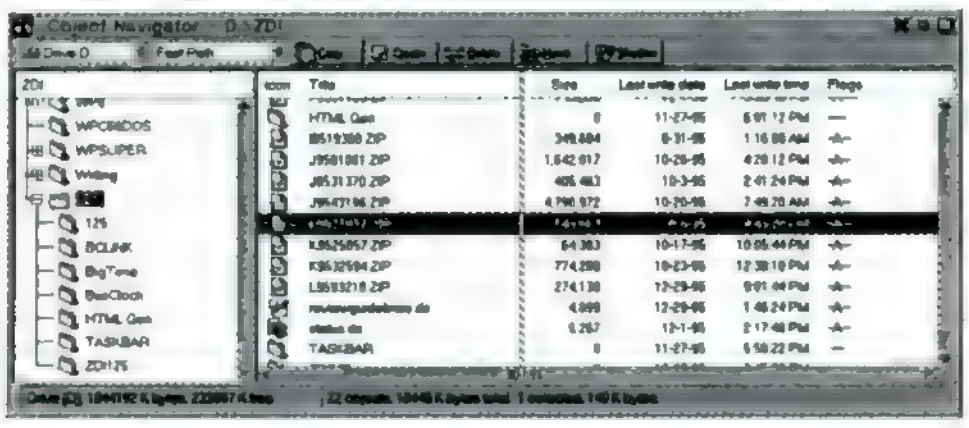
DeskMan/2 Productivity Pack ($99.95), from Development Technologies (803-790-9230), offers another suite of desktop enhancements. Less splashy than Object Desktop, DeskMan/2 crawls under the covers of the operating system, giving you control over the way your system works and helping you recover from desktop disasters. DeskMan/2 makes it easy to backup and recover the desktop, as well as to control the desktops of individual or networked OS/2 users. You also get a virtual desktop manager, VUEMan/2, REXX and CID support, and configuration snapshot utilities. Its tool suite lets you delete "undeleteable" objects (and not restore them), personalize desktops, and selectively or globally control object styles, menu items, and WPS capabilities. DeskMan/2's utilities might appear as unexciting as a screwdriver, but you'll find them equally as indispensible.

Desktop Observatory ($179), from Pinnacle Technology (800-525-1650, 317-279-5157), is one example of several OS/2 utilities that specialize in enhancing the limited security built into the Workplace Shell. (DeskMan/2 provides most of these features, too, as do Syntegration's Secure Workplace and Racal's PC-Guard. They vary in implementation, sometimes in major ways, but the purpose remains the same.) Desktop Observatory lets you restrict the behavior of objects; for instance, it can prevent you from deleting, copying, or renaming them. You can password-protect objects and create new desktops over the network.

Desktop Commander ($59), a lighter

version of Desktop Observatory, has no logging, auditing, or password support. The company's **KidProof/2** ($59) is a version customized for home users, so that each family member can have his own desktop (and the kids can't delete Mom's work folder by accident).

You'll find plenty of small treasures in OS/2 desktop enhancement utilities as well. For instance, **XIT 2.0** ($15), from CodeSmith (*http://www.wilmington.net/bmtmicro/catalog/xit.html*), adds the ability to "roll up" an application so that just the title bar appears on the desktop. At its low price, the simple and useful XIT is an excellent value.



Object Desktop has a gaggle of WPS enhancements, from the custom-tailored appearance to the improved Tab launchpad.

ANTIVIRUS

Viruses are much less of a concern under OS/2 than in other operating systems, as the same memory management found in OS/2 that keeps errant but well-meaning applications from eating up RAM or resources belonging elsewhere in the system also keeps malicious viruses from stomping on your system. However, some viruses can still affect OS/2 systems, especially those that chomp on the boot sector. A handful of OS/2 antivirus programs are thus available, all of which work similarly to their DOS and Windows brethren: AntiVirus/2 ($49), from IBM Corp. (800-742-2493, 914-765-1900); Dr. Solomon's Anti-Virus Toolkit ($125), from S&S Software International (800-310-9078, 617-273-7400); and VirusScan for OS/2 ($65), from McAfee Associates (800-866-6585, 408-988-3832).

BACKUP

Native OS/2 backup software is especially important for OS/2 users, because DOS backup programs won't support OS/2's long file names or extended attributes.

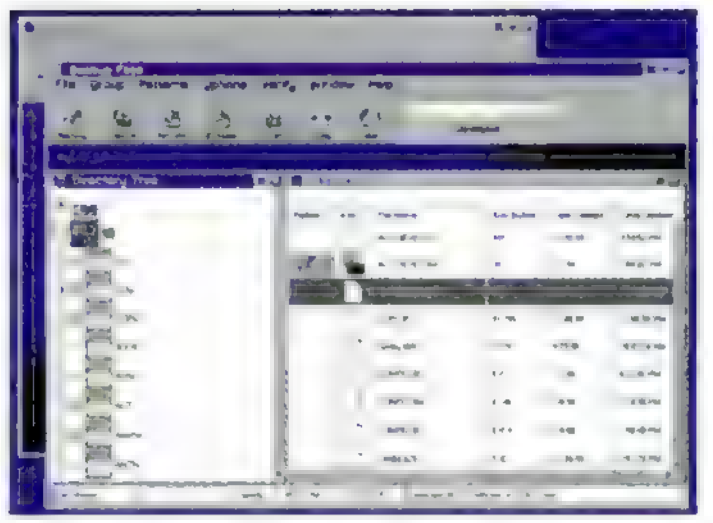
The user interface on **BakUpWiz** ($149), from PCX (800-800-4729, 619-259-9797), is only text-mode, and you won't be awestruck by its beauty. That might not matter to you, since backup software often runs from a scheduler or command line anyway. BakUpWiz is reliable and blindingly fast (the fastest of all we tested), and the company claims it will work with nearly any SCSI device.

Back Again/2 Personal and **Professional** ($49 and $149, respectively), from Computer Data Strategies (800-284-4156, 612-730-4156), also support SCSI devices and share a much more aesthetically pleasing interface. They also work more elegantly with the Workplace Shell. For instance, to back up a directory or drive, you can drag it and drop it on the Back Again/2 device and the backup will begin immediately; if you're unsure of what to do, you can right click to see a menu. Back Again/2 supports floppy disk and logical drives.

BackMaster ($89.95), from MSR (409-564-1862), provides support for QIC 40/80/3010/3020 format drives including QICwide, Travan, and parallel tape drives. BackMaster also supports a few SCSI devices. We tested BackMaster with an Iomega Ditto drive and found it friendly and straightforward.

DualStor ($55), from IBM Corp. (800-426-7299, 914-765-1900), also provides support for QIC/80 format drives, but it also has its own tape format. The DualStor format lets you erase any backup set on the tape (not just the last one), and permits a Restore to begin in the middle instead of the first tape in the series.

Desktop Observatory lets you restrict the behavior of desktop objects.



BackAgain/2's attractive user interface follows OS/2 drag-and-drop rules.

MEMORY MANAGEMENT

Dozens of applications help you optimize system parameters, from cache size settings to performance monitoring tools. **Performance Plus** ($39.95), from Clear & Simple (203-658-1204, 860-658-1204), has several optimization utilities, as well as a short book that explains what performance tuning is all about. The Optimize tool recommends modifications to your CONFIG.SYS, which you can adopt or ignore. You then use Performance Plus's simple benchmark test program to see what effect the changes had.

PM Patrol 4.0 ($25) from WallyWare (800-414-4268, 708-510-7412), a resource monitor that displays a status line at the bottom of the screen, shows the current status of many of your system parameters. It keeps track of nearly everything in your system, reporting information on things such as processes, threads, DLLs, and drivers. PM Patrol monitors events and notifies you of changes in resource usage.

CPU Monitor Plus ($129.95), from BonAmi (508-371-1997), a system monitor and analysis package on steroids, gathers statistics about memory usage, CPU time, process IDs, idle time, and thread status. It logs activity from serial ports and hard disks, lets you dynamically change process priorities, and kills runaway programs.

UNINSTALLERS

Although OS/2 applications can be just as rude and invasive as applications for other operating systems, the only entry in the uninstaller category is **Unimaint** ($99), from SofTouch (800-944-3028, 405-947-8085). To get rid of an application, you drag and drop the program object to the Unimaint Uninstaller, which explores

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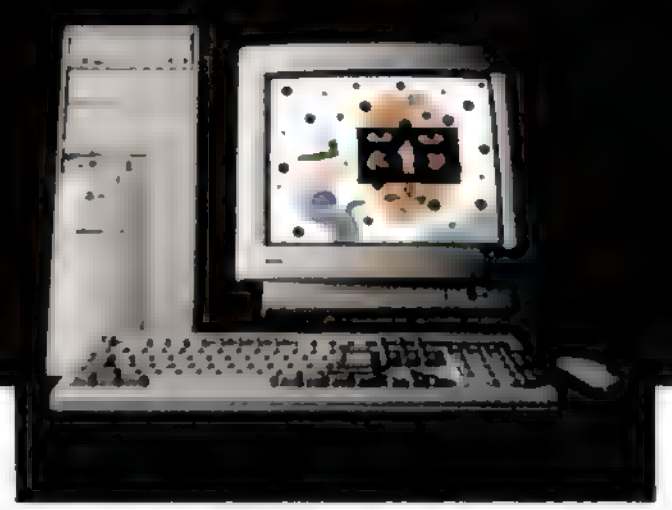

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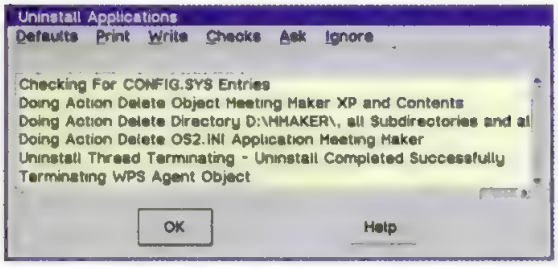
your system to find out where the data files are kept, removes any program references in the .INI files, unregisters associated nonstandard Workplace Shell classes, and so forth. It confirms everything with you before making the actual deletion.

FILE MANAGER REPLACEMENTS

The OS/2 Drives object would probably land low on any list of "favorite OS/2 features." It's awkward and nonintuitive. Fortunately, there are alternatives.

FileStar/2 ($79), from SofTouch (800-944-3028, 405-947-8085), a fast and functional text-mode application with a minimum of bells and whistles, delivers what it promises without a lot of complications. It includes extras like system status updates and a zipper.

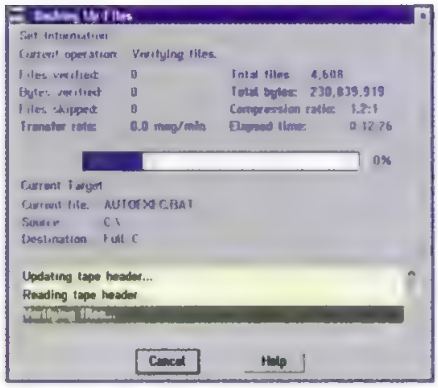
Depending on your viewpoint, you'll find **FM/2** ($40 personal edition, $80 commercial edition), from BareBones Software (318-222-3455), to be the kitchen sink of OS/2 utilities—either feature-rich or overly complex. It has a unique container feature that lets you temporarily group objects so that you can work on them later.



To uninstall an OS/2 application using Unimaint, just drag and drop the program to the application window.

Other OS/2 utility suites incorporate useful file management features. For instance, Stardock's **OS/2 Essentials** ($39.95) includes DirMaster, a practical if unassuming file manager. Stardock's Object Desktop also includes an excellent file manger.

Performance Plus's Optimize tool gives unambiguous advice about system changes.



DualStor has library functions that store the name, tape location, and history of your files.

DISK UTILITIES

It's amazing that the computer industry managed so long without **PartitionMagic** ($69.95), from PowerQuest (801-226-8977). PartitionMagic lets you change the size of your hard disk partitions on the fly without destroying data. You can add, delete, resize, or format partitions. When you resize a FAT partition, PartitionMagic resizes the clusters, which can recover wasted hard disk space. Of particular interest to OS/2 users, PartitionMagic can convert a partition from FAT to HPFS without the tedium of backing up, reformatting, and restoring your files.

SWISS ARMY KNIVES

Several companies have created utility suites replete with OS/2 system utilities. Perhaps the best known is **Gammatech Utilities** ($99), from SofTouch (800-944-3028, 405-947-8085). These utilities include an undelete superior to the one included with OS/2 Warp, optimizers for FAT and HPFS volumes, a disk sector editor, partition repair tools, and more.

The Graham Utilities ($93), made by WarpSpeed Computers and sold by Development Technologies (803-790-9230), looks and acts very much like an earlier version of Norton Utilities. The package's functions include a batch enhancer, remote disk management tools, Unix-like tools such as uuencode and grep, and system diagnostics.

Stardock's OS/2 Essentials would be better described as an OS/2 starter kit. In addition to the file manager capabilities already mentioned, it includes Filebar (a status/shortcut line at the bottom of your screen), Filegraph (which shows your disk usage graphically), a screen saver, and a trashcan.

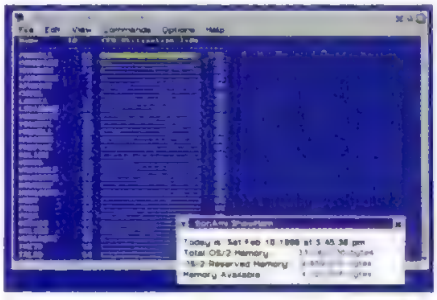
"BUT WAIT, THERE'S MORE!"

If you're still a command line junkie, you probably discovered **4DOS** ($69), from JP Software (800-368-8777, 617-646-3975). 4DOS's sister program, **4OS2** ($69), replaces OS/2's CMD.EXE, and it's irreplaceable to those who like to type in a command window.

Adding fonts in OS/2 is awkward and slow. **FontFolder** ($20), from Cliff Cullum (on CompuServe: OS2BVEN, Library 1), improves the process and supports font libraries, so you can quickly swap collections of fonts in and out of your system.

The major weakness in OS/2's HPFS is that it's invisible from DOS. **AMOS** ($33), from Allen Mertner (on CompuServe: OS2BVEN, Library 1), lets you read (but not write) HPFS files when you're in DOS, so you can have the best of both worlds.

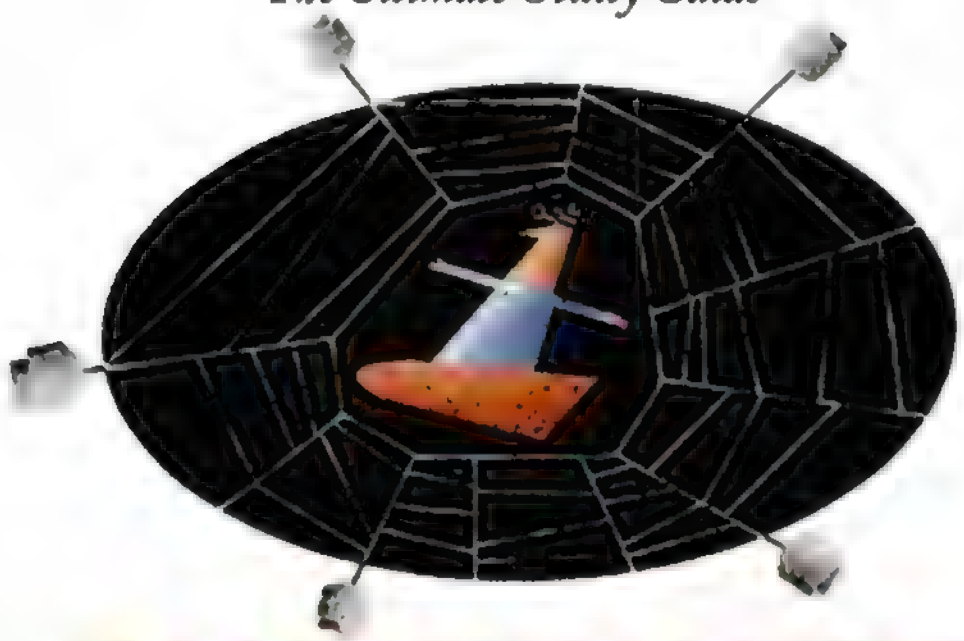
If you want disk compression utilities, you have two choices. The most well-known is **Stacker** ($149) from Stac (800-522-7822, 619-794-4300), but it only supports FAT drives. **DCF/2** ($99.95), made by Proportional Software (and, like The Graham Utilities, sold by Development Technologies), supports HPFS as well as FAT. It also permits virtual disk units, so you don't have to compress a complete partition.



CPU Monitor Plus displays a running check on system activity.

To explore OS/2 utilities further, visit the Internet site "OS/2 Must-Have Utilities And FTP Links" at *http://www.os2.hammer.org/OS2*. □

The Ultimate Utility Guide



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WE TEST NINE UTILITIES THAT HELP YOU ORGANIZE THE INFORMATION YOU'VE FOUND ON THE WEB AND STAY ON TOP OF THE LATEST UPDATES.

By Edward Mendelson

Internet organizers are designed to supplement or replace the relatively simple bookmarks or Favorites menu in your browser. They range from simple address-book utilities to elaborate programs that can report changes on some or all of the Web sites of your choice listed in your bookmarks menu or Internet shortcuts. Some of these utilities not only tell you that a Web site has changed but show you the changed text itself. Others tell your browser to jump to a Web site as soon as you click on its name in the organizer; still others create HTML pages containing sets of links that you can load into your browser. Some simply make you copy an address from the utility and paste it into your Web software manually. As with all utilities, too many features can be worse than too few if they make the interface confusing and the program slow to load. But the right one can greatly increase your ability to glean information from the Web. Our roundup of nine can point you to the one that suits your needs.

CLEAR SOFTWARE INC.

Clearweb

Clearweb 0.4, a Netscape Navigator helper application, is a powerful bookmark utility that can help you get a grip on complex Web sites. Its editor lets you create and maintain a hierarchical organization for bookmark files, while its viewer displays site contents in a clear graphical map format. Clearweb, currently in beta testing, is available for free download. Once it ships, the editor will cost $49; the viewer will be free.

The editor has two components: an outline editor and a map editor. The outline editor makes it easy to edit your bookmark files, which are displayed in a hierarchical tree format. You can import a bookmark file and redesign it, or you can start from scratch using Clearweb to capture Web pages and hyperlinks. Editing is easy, using either cut-and-paste or drag-and-drop. The map editor is best used for altering the size, shape, and color of map elements. When you are finished, anyone with the Clearweb viewer will be able to view your bookmark map and launch pages. If you want to export your bookmarks into an HTML document to view within your browser, you need the editor.

The beta version of Clearweb we tested still showed some rough edges. It had limited shortcut key support, and some of its functions were not particularly intuitive. But its impressive tools give you

Internet Organizers

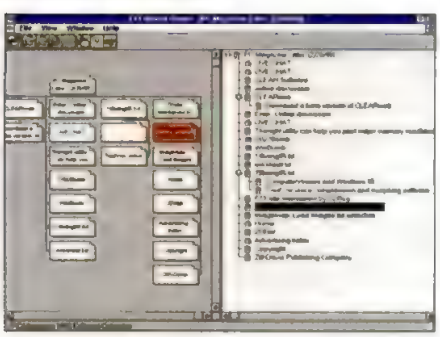
■ YES ■ NO

Products listed in alphabetical order	Clearweb 0.4	KnowIt All 1.0	PC MAGAZINE EDITORS' CHOICE NetBuddy	Netscape SmartMarks 1.0,* Smart Bookmarks 1.0	PC MAGAZINE EDITORS' CHOICE Surfbot 2.0	Surfer Central 1.21	URL Grabber 95	Vizion Web-Special 1.2	Webodex Organizer
Grabs URL from browser	■	■	■	■	□	■*	□	■*	■
Sends URL to browser	■	■	■	■	■	■	■	■	■
Tree-structured site list	■	■	■	■	■	□	□	□	□
Exports site list in HTML	■	□	■	■	■	□	■	□	□
Off-line page viewer	□	□	■	□	■	□	□	□	□

* Works only with Netscape Navigator

what you need to create and manage bookmark files and to display them in a clear, fun, and intuitive way as maps.

Clearweb 0.4. List price: Viewer, free. Editor: beta free for download; final, $49. Clear Software Inc., Newton, MA; 800-338-1759, 617-956-6755; fax, 617-965-5310; http://www.clearsoft.com. *Circle 486 on reader service card.*



Clearweb's viewer clearly maps Web sites.

GRASP INFORMATION CORP.

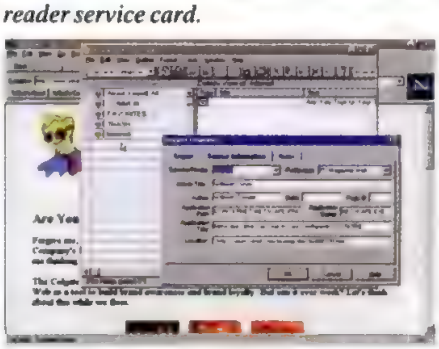
KnowIt All

Grasp Information Corp.'s $99.99 KnowIt All 1.0 can be used as an Internet organizer, but that's only a small part of its main function: to serve as a database for any snippet of text you select in virtually any Windows application. KnowIt All works in two modes: Minimized, it turns into a small toolbar, with icons representing the categories in which you want to store your snippets. In full-screen mode, it offers either an expandable outline, a sticky-note metaphor, or a more formal bulletin-board interface to display the content of the snippets. (Full-screen mode doesn't really require the entire screen, just an expanded window.)

After you select text in an application like your Web browser, you click on an icon on KnowIt All's toolbar to store the selected text. The utility automatically stores the URL of the source page, but you have to enter the title and other information by hand. Later, if you highlight the snippet in full-screen mode, you can use either the right-click menu or a top-line menu command to jump to the URL in Microsoft Internet Explorer, Netscape Navigator, or Spyglass Enhanced Mosaic (one of which has to be running for this trick to work).

The utility doesn't try to support FTP sites or other Internet resources that you can't access from your Web browser, and you'll have to select some of the text on a browser page before you can transfer the URL into KnowIt All. But the program does provide a uniquely simple way to jump between the data that you have collected on the World Wide Web and the source of that data. This is the kind of utility that, much like the DOS-based Lotus Agenda, will give you maximum effectiveness only if you're willing to put virtually your entire life into it. Still, no other program stores Web-based information in such an efficient and effective manner. PC Labs tested a beta version of KnowIt All; the shipping version should be available by the time you read this.

KnowIt All 1.0. List price: $99.99. Grasp Information Corp., Farmington, CT; 800-683-2561, 860-676-0355; fax, 860-676-2570; http://www.grasp.com. *Circle 487 on reader service card.*



KnowIt All: for grabbing and categorizing.

INTERNET SOLUTIONS INC.

NetBuddy

PC MAGAZINE EDITORS' CHOICE

This high-quality freeware utility from Internet Solutions alerts you when there's been a change to any of the Web pages in which you're interested. The compact main window displays the pages you want to monitor, and, when you tell NetBuddy to check for changes, it scans each page and changes the icon next to the name of the page if anything has changed. A mouse click displays the page in NetBuddy itself, either in plain-text format with the changes highlighted or, if the page is a graphic (like a weather map), as a .GIF file. NetBuddy is much faster than your browser, and you don't need to open

NetBuddy's list of monitored pages.

your browser at all to view the pages, although a button or keystroke will launch your browser and jump to the page if you want to see it in formatted form or follow any of its links.

You choose the pages you want to monitor by importing your browser's hot list, or by clicking a button that automatically inserts the name of the page currently displayed in your browser. (This last feature wasn't entirely reliable with Netscape 2.0: When we clicked on the but-

ton that's supposed to grab the page currently in the browser, NetBuddy often launched another copy of Netscape instead.) The list of monitored pages appears in a tree-style outline that you can easily reorganize with toolbar buttons. You can tell the program to check individual pages or folders for changes at different intervals; you can even tell the program to continue hammering at a page until the page changes.

NetBuddy gives you all the help files you pay for—meaning that there's no help at all except for some laconic tool tips. But a few minutes of experimentation is enough to learn all its features. Except for its minor problem with grabbing currently displayed pages, NetBuddy, a 16-bit Windows program, is elegant, compact, and far better designed than most of the utilities for which you have to pay.

NetBuddy. List price: Free. Internet Solutions Inc., Seattle, WA; 206-547-3881; fax, 206-547-4957; http://www.netree.com/netbuddy.html. *Circle 488 on reader service card.*

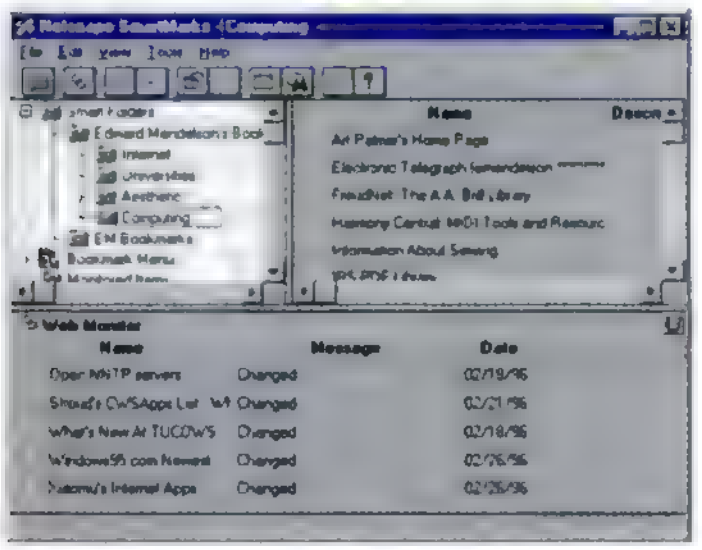
NETSCAPE COMMUNICATIONS CORP.

Netscape SmartMarks

FIRST FLOOR SOFTWARE

Smart Bookmarks

Written by First Floor Software, these virtually identical utilities check selected Web pages for changes in text, links, or both, and let you launch the altered page in your browser. Smart Bookmarks 1.0 is available from First Floor for $24.99. Netscape SmartMarks 1.0 is the licensed version available from Netscape Communications ($24.95). SmartMarks works only with Netscape Navigator; Smart Bookmarks works with Navigator as well as Microsoft Internet Explorer and Spyglass Mosaic. Both come with an extensive, well-chosen list of sites from which you can select the pages you want to monitor. You can also import your browser's bookmarks list or drag sites from your browser directly into the list of sites in the Smart Bookmarks window. When you run Netscape and either version of this utility together, the utility takes over from Netscape's native bookmarks list, and you can add a Web page to the list of monitored pages directly from Netscape's bookmarks menu. You can set the utility to be launched automatically whenever Netscape launches.



Netscape SmartMarks keeps you updated.

One of this program's cleverest features is its SmartFinder, which saves the results of a search on any of four major online search engines and then compares these results with the results of a scan at a later date. Instead of launching the search engines manually, you simply run Smart Bookmarks to see if the results have changed. In practice, you'll get many false reports of changes, because many search engines also report the number of hits of words similar to the one you want, but with some careful adjustments this feature can be highly useful. Another feature will allow authors of Web pages to incorporate an extension to HTML that will let the page send a bulletin directly to Smart Bookmarks when the utility scans the page; you can then scan the bulletin in one of the utility's windows.

PC Labs tested Version 1.0 of the utility. Until Version 2.0 of the program appears (around the time you read this), Smart Bookmarks won't let you check different pages or groups of pages at different times in the way that NetBuddy does, and you'll have to get the new version if you want the program to download changed pages for reading off-line. But in spite of a sometimes confusing interface—due for improvement in Version 2.0—Smart Bookmarks and Netscape SmartMarks have the advantages of tight integration with Netscape and a set of features and functions that, although less ambitious than those in NetBuddy, may well be all you need.

Netscape SmartMarks 1.0. List price: $24.95. Netscape Communications Corp., Mountain View, CA; 415-528-3777; http://home.netscape.com/comprod/smartmarks.html. *Circle 489 on reader service card.*

Smart Bookmarks 1.0. List price: $24.99. First Floor Software, Mountain View, CA; 800-639-6387; 415-968-1101; fax, 415-968-1193; http://www.firstfloor.com. *Circle 490 on reader service card.*

NetBuddy
Surfbot

Our Editors' Choice award goes to two products that automate the process of keeping you up to date on changes to your most-visited Web sites.

Internet Solutions' NetBuddy, a free, high-quality, 16-bit Windows utility, does a great job of monitoring sites. You don't even need a browser to view the pages, although a button click sends your favorite browser to the pages NetBuddy picks. You select sites to monitor by importing your browser's hot list or by clicking a button as you surf. Lists of pages to monitor, clearly laid out in a tree hierarchy, are easy to reorganize. If you want to track often-changed sites, NetBuddy gets the job done quickly, efficiently, and elegantly.

If you need more powerful and flexible update notification, Surflogic LLC's Surfbot, Version 2.0, offers the greatest range of functions and the closest integration with Windows 95 and current browsers that we saw. If you just want to know when selected pages have changed, or if you want the latest news from an online service, Surfbot's Agents (built with its Agent wizard) can do the job. Agents let you customize rules for scanning frequency and the amount of information downloaded. Surfbot may offer too much power for the casual user, but for industrial-strength scanning it's tops.

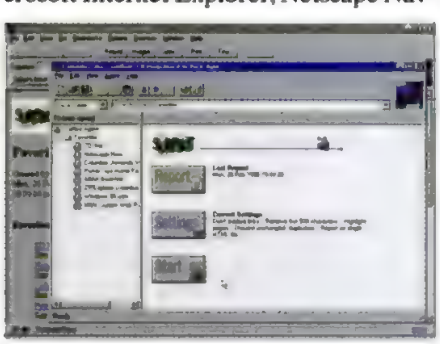
SURFLOGIC LLC

Surfbot

This elegant, full-featured, $40 utility from Surflogic LLC offers a staggering range of options for keeping up to date with changes to your favorite Web sites. You tell Surfbot 2.0 to check for changes to the sites listed in your browser bookmarks, to any individual site or group of sites that you choose, or to the lists that come with the program. The utility goes out to the Web, scans the selected pages, then displays the changed files by showing you either the first few hundred characters (you choose how many) in text mode or full HTML pages that you view in your browser. You can also tell the program to scan standard Internet search engines for changes in the result of a search.

Each list of sites to scan can have customized rules for scanning frequency and the amount of information downloaded; this combination of lists and rules is called an Agent. A wizard walks you through the otherwise complex steps for creating an Agent, and you can link an Agent to a Windows 95 Internet shortcut. When you right-click on the shortcut, the pop-up menu includes a command for reporting the text retrieved by the agent and the date of the retrieval.

Surfbot works equally well with Microsoft Internet Explorer, Netscape Navigator, or Spyglass Enhanced Mosaic, and can export lists either as HTML files or as a set of Internet shortcuts. Because Surfbot optionally loads your browser's current bookmarks when it loads, you don't have to maintain your bookmarks and Surfbot's agents separately.



Surfbot: industrial-strength scanning.

You may not want to check every item on your bookmarks for new data each time you run Surfbot, but you can prune your list of bookmarks to create a new agent that scans a subset of your bookmarks. If you're prepared to let Surfbot work for hours at a time and churn through megabytes of data, you can tell it to search all the pages linked to a scanned page in addition to the page itself.

Surfbot isn't for casual use, but if you need industrial-strength Web scanning and organizing in an elegant, up-to-date interface, you won't find anything better.

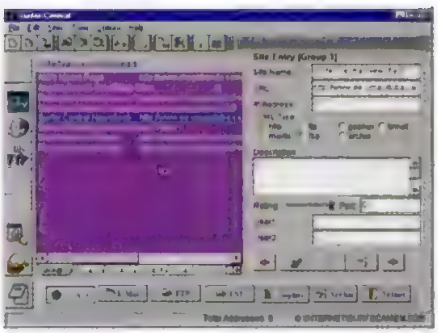
Surfbot 2.0. List price: $40. Surflogic LLC, San Francisco, CA; 415-731-2732; fax, 415-731-0584; http://www.surflogic.com. *Circle 491 on reader service card.*

JAMES WALETZKY

Surfer Central

This $15 address book of Internet sites by James Waletzky lets you keep hundreds of Web sites, newsgroups, FTP sites, and other Internet addresses in a complex but coherent interface. Surfer Central 1.21 looks like an address book, with tabbed pages and simple lists of sites and descriptive names surrounded by a profusion of buttons and data-entry fields for more advanced functions. You can start by importing any list of browser bookmarks. Surfer Central displays them in a list box, and you select one or more to assign to a page in the address book. Address categories like World Wide Web sites and telnet addresses are displayed separately, and you can create multiple address books in separate files. For each entry, you can enter comments and a numerical rating of its interest to you, as well as other details; the program lets you choose which of its predefined fields to display. Entries can be modified while being viewed, so you don't have to switch in and out of a special editing mode as you must with other address-book programs.

You can launch an address in the current session of Netscape (though not in other applications) simply by clicking on the entry in the address book. With other applications, you drag the entry to one of the application buttons to launch the application and load the address. A pop-up menu lets you load the page currently displayed in Netscape as a new entry in the address book (though this trick won't work with other browsers). You can export address databases as ASCII files but not as HTML files that you could display in your browser.



Surfer Central is complex but coherent.

Surfer Central is sleek and efficient, but it sometimes gets confused when importing a Netscape bookmark file, in some cases failing to import an address when it imports the title that goes with that address. The program is still stuck in the Windows 3.1 era: It has a large button that launches your Winsock software, a feature no longer needed under Windows 95 or Windows NT. Its interface is inconsistent, with some features available only from a right-click menu and not from the top-line menu. But this utility still stands out among today's Internet address books for its flexibility and power.

Surfer Central 1.21. List price: $15. James Waletzky, Coquitlam, British Columbia, Canada; 604-522-9084; fax, 604-293-5787; http://www.ee.umanitoba.ca/~waletz/.

BROOKLYN NORTH SOFTWARE WORKS INC.

URL Grabber 95

This miniature toolbar, available for $19.95 from Brooklyn North Software Works, lets you create bare-bones HTML pages containing lists of your favorite links, with brief descriptive text that you provide. You open one of these pages in your browser and click on the link to move to the desired site.

To prepare the page, you select a URL address in a word processor, browser, or any other application and use the application's Copy command to load the address into the Windows Clipboard. You then double-click on the Paste button in URL Grabber 95, and a pop-up window lets you enter descriptive text or jump directly to the site in your browser. Other buttons on the URL Grabber toolbar let you view

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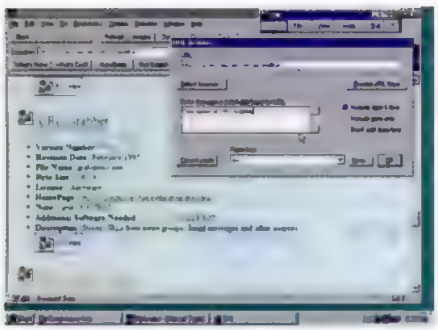


URL Grabber 95: pages of favorite links.

your saved data and create an HTML file. The program isn't smart enough to grab the URL of the page currently displayed in your browser; it's designed more to make it easy to jump to sites you haven't seen yet rather than to store sites you've already found—although it can store those too, if you select and copy the address of a site and paste it in URL Grabber.

The program can create pages of up to 32K in size—enough to include about 300 links. You can't load more than one set of URLs at a time, and the program won't let you launch more than one copy at a time. You might wish for more automation and flexibility, but URL Grabber doesn't take up much screen space, and it works efficiently if you don't mind doing much of that work by hand.

URL Grabber 95. List price: $19.95. Brooklyn North Software Works Inc., Bedford, Nova Scotia, Canada; 800-349-1422, 902-493-6080; fax, 902-835-2600; http://www.mlink.ca/brooklyn. *Circle 493 on reader service card.*

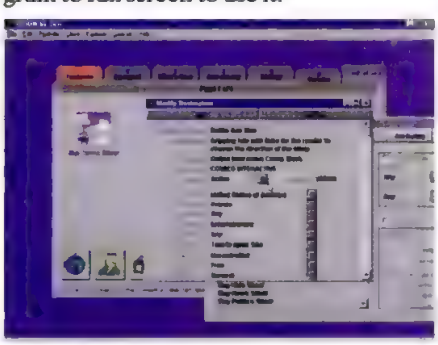
SIRSI CORP.

Vizion WebSpecial

Vizion, an elaborate Internet-site database from SIRSI Corp., is the Web organizer you need if you want to be able to see a list of sites you've previously categorized. The program comes in a free, limited version called Vizion WebSpecial 1.2 (reviewed here) and a $19.95 version called Vizion Pro. Both come with a miscellaneous selection of sites, already annotated and displayed on tabbed pages, devoted to categories covering everything from Health to Comics. To add the site currently displayed in your Web browser, click on an icon, then navigate to the confusing menu where you add your own annotations. You store the site on a tabbed page with other related pages, and identify it with one of a small gallery of clip-art icons provided with the program.

When you select the site later, the program automatically launches your Web browser, Gopher client, FTP client, or telnet client—depending on which one you specified when categorizing the site. The program's only unique feature is its ability to display a list of sites categorized according to rankings or filters you specify. Prepare to spend many hours categorizing sites if you plan to use this feature.

Among the many annoyances built into this program is a display that, should you use any screen size larger than 640 by 480, wastes massive screen space on an unused blue border around the tabbed catalog pages. If you reduce Vizion's window from the default full-screen display, you see only part of the tabbed pages—with the same blue border on two sides. You can't maneuver the tabbed pages into the center of the window, so you must expand the program to full screen to use it.



Vizion is almost too precise.

Few programs let you organize your Web sites with as much precision as Vizion. But once you've used the program for a while, you may prefer software that's less precise in its categories and more usable in its interface.

Vizion WebSpecial 1.2. List price: Free; Pro version, $19.95. SIRSI Corp., Huntsville, AL; 800-242-2233, 205-922-9820; fax, 205-922-9818; http://www.sirsi.com/. *Circle 494 on reader service card.*

NOVAWEB INTERNET PRODUCTIONS INC.

Webodex Organizer

Novaweb Internet Productions' Webodex Organizer looks like a high-tech Rolodex, with buttons and LEDs on the left and address pages on the right. This $14.95 Internet address book turns out to be less

Webodex: not as sophisticated as it looks.

elegant than its surface, but it's still a powerful organizer. It comes with a large selection of preselected Web sites, and lets you add your own by importing bookmark files or by automatically importing the address currently displayed in your browser.

The buttons on the left pane of the interface are divided into three groups. The top group lets you grab the current URL, import bookmark files, and perform other housekeeping tasks. The middle group lists the major categories, such as Business or Entertainment, into which you've divided your addresses. The lower group of buttons displays subcategories of the main categories (like Movies and Comics under the Entertainment category). Don't even think about using these buttons without a mouse.

The right-hand address page is much lower-tech. Addresses and optional comments fill each page, and tabs jump to different letters of the alphabet. You can see only one page at a time, so you must thumb through all the entries under a letter to find the one you want.

You will also not enjoy the process of adding items to the database. At each stage, you must navigate drop-down menus to select categories. If you want to create a new category, you have to cancel the data entry, create the new category, and start over. In order to edit your comments, you have to switch to a special edit mode. Webodex Organizer stores a lot of data but doesn't make it easy to modify any. □

Webodex Organizer. List price: $14.95. Novaweb Internet Productions Inc., Dartmouth, Nova Scotia, Canada; 902-468-2578; fax, 908-468-9869; http://www.novaweb.com/webodex. *Circle 495 on reader service card.*

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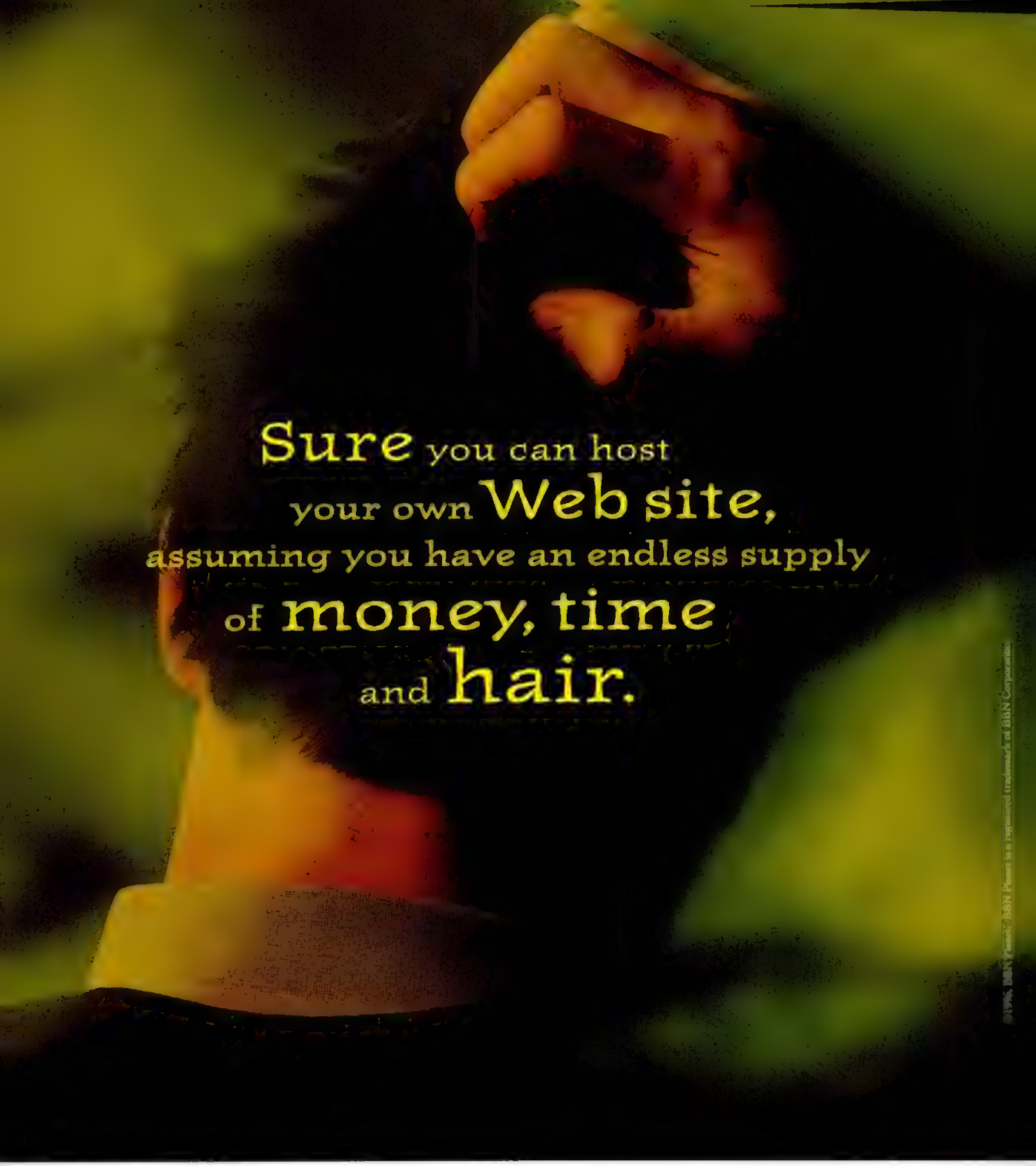

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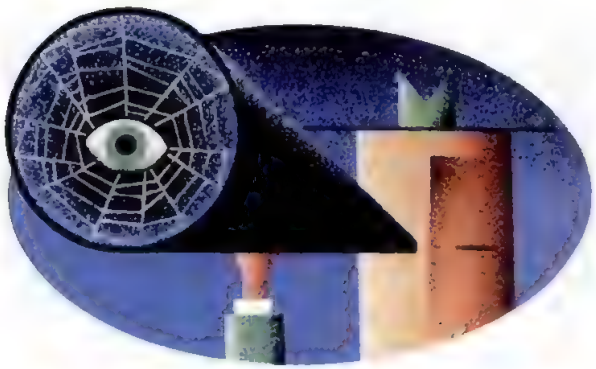


INTERNET SEARCH TOOLS

SO MANY MILLIONS OF MEGABYTES OUT THERE AND SO LITTLE TIME. WE REVIEW SIX SEARCH UTILITIES THAT HELP YOU SCOUR THE INTERNET FOR THE INFORMATION YOU NEED.

By Sheryl Canter

The six utilities covered here take two basic approaches to searching for information on the World Wide Web. Some of them provide huge databases of sites—typically on CD-ROM—which you surf off-line to refine your search before connecting. Others go online to query the Web's powerful search engines and build databases and indexes for you. Some of these products offer suites of utilities that do both, besides providing other functions.

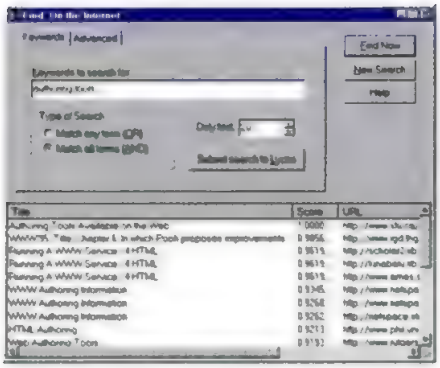
COREL CORP.

Corel Internet Mania

Corel Internet Mania 1.01 ($24.95) is a suite of eight Internet utilities: Lycos Web Search, Web Catalog, Web Page Update Notifier, NewsScan, QuoteScan, Home Page Author, Personal Web Server, and Corel FTP. All are 32-bit and multithreaded, and all run on Windows 95 or Windows NT. Lycos Web Search and Web Catalog offer different ways to search off-line for sites. This review will focus on those search tools.

The Lycos Web Search database—stored on CD-ROM—is a snapshot of the first half-million records of the online Lycos search facility. Under Windows 95, the program installs itself under the Start menu's Find option for easy launching. The Web Search interface is a dialog box with two tabbed pages: Keywords and Advanced. The Keywords page is where you type in keywords to search on and where you set your main search criteria. You can request that one or all of your keywords be matched by using Boolean operators (AND, OR). The Advanced page lets you select how close the match must be; there are five levels, Loose to Strong. You can also specify how many URLs to return. If you click the button labeled "Submit search to Lycos," Web Search will launch your browser and submit the search to the online version of the Lycos search engine.

To search off-line, you press the Find Now button. A list box with the search results will open beneath the tabbed pages. The headers along the top of the list box look like the header buttons in Explorer, but pressing them does not sort the output. To obtain information about a site other than its title, search score, and URL, right-click on the entry: An outline and abstract for that site, if available, will appear in a pop-up box. To go to a selected site, double-click on its entry in the list box. Web Search will launch your browser and call up the site.



Corel Internet Mania's Lycos Web Search dialog showing search results.

Corel plans to release periodic updates, but there is no subscription service, and the off-line Lycos database will age quickly.

Web Catalog is an off-line database of Web sites organized hierarchically by topic. You move through the categories by clicking on the branches. Double-clicking on a subject node will display the sites in that category. If you see a page that contains information that interests you, you can double-click on it and Web Catalog will use your browser to display it.

Internet Mania consists of six other utilities in addition to the off-line search tools. Web Page Update Notifier lets you know when favorite Web sites have been altered and are due for another visit. Home Page Author is a limited but easy-to-use tool for creating Web pages. Personal Web Server lets you publish Web pages and downloadable files. Corel FTP is a file-transfer utility that you can use to upload your Web page to a service provider or to download files of interest from all over the Internet. Its ability to display file descriptions, when they are available, makes it especially useful. QuoteScan checks stock prices and displays 20-minute-delayed data. Its OLE automation support allows you to transfer the data directly into an Excel spreadsheet. NewsScan searches the user groups you specify for messages containing a given text string; you double-click on a message to read it. The built-in reader does not let you respond to messages, so an option is provided to use an external news reader, either for all messages or for those that have not yet expired. Unfortunately, this option did not work on our test system.

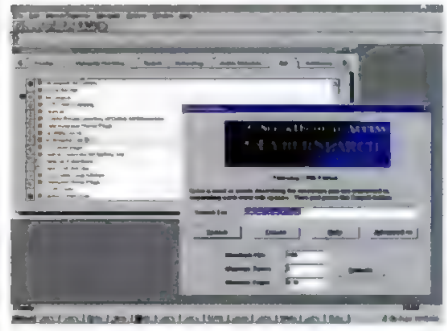
Internet Mania's off-line search facility is useful for now, but it will quickly become outdated, and there is no stated update policy. Its other utilities, however, are very useful and make Internet Mania a useful purchase.

Corel Internet Mania 1.01. List price: $24.95. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-3733; fax, 613-728-9790; http://www.corel.com. *Circle 496 on reader service card.*

FRONTIER TECHNOLOGIES CORP.

CyberSearch

CyberSearch ($29.95), which comes on CD-ROM, is an off-line search facility that uses a snapshot of the first half-million records in the Lycos database. The database is updated monthly, and a subscription costs $9.95 per month. The version available at the time of this writing works only with the bundled Frontier Technologies Web Browser.



CyberSearch's two main components: a search facility and the Internet Organizer.

Version 2.0, which works with third-party Web browsers, will be available by the time you read this.

Search results are displayed in a separate window. You can mark the links for viewing at a later time, retrieve them immediately, or save them to the Organizer. When you select more than one URL for retrieval, CyberSearch will offer to open them all at once automatically. Don't try this unless you have a lot of memory, because a separate window is opened for each URL. In the Version 2.0 beta, multiple instances of your browser are launched if you select more than one URL for retrieval, requiring even more memory.

The Internet Organizer has tabbed topics across the top and the letters of the alphabet down the side for quick scrolling down a long list. You can import bookmarks from Netscape and Mosaic. You double-click on a URL to view its associated Web page, and a right click on an entry displays a one-line descriptive name and the URL. There is no area for comments or other information.

CyberSearch's strength is its large, off-line, regularly updated database. Its weakness is that the database structure for storing what you find is rather primitive.

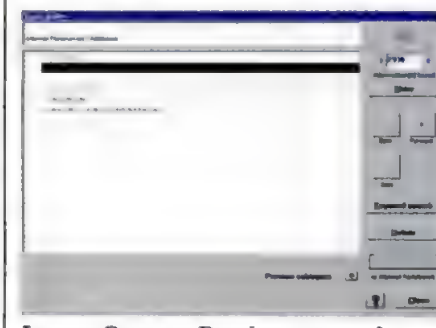
CyberSearch (February 1996). List price: $29.95; subscription, $9.95 per month. Frontier Technologies Corp., Mequon, WI; 800-879-0075, 414-241-4555; fax, 414-241-7084; http://www.frontiertech.com/products/cybrsrch.htm. *Circle 497 on reader service card.*

MARTIN BOHNET MARKET CONSULTING

Internet Resources Database

Internet Resources Database (IRD) is a special-purpose database for storing Web pages, mailing lists, newsgroups, FTP sites, and telnet sites. The Notebook feature can be used to store a list of favorite sites, the HTML source for interesting Web pages, or e-mail addresses, which you can search by keyword. The program is shareware and can be downloaded from the company's home page on the Web. Users are encouraged to add to the database files and upload new information to share with others.

IRD isn't as slick as some off-line search tools. The window isn't sized quite right when it opens, for example, and you can tell the author isn't a native English speaker—but IRD is a useful tool. The database is well designed, and the information in it is high-quality and updated constantly. Information is sorted by topic and resource type for easy



Internet Resources Database: spartan but highly configurable.

browsing. You can search by keyword, edit the database to correct errors, and add keywords and descriptions. To access a resource in an IRD database, you copy its address to the Clipboard, then paste it into your browser; the browser is not launched automatically.

IRD doesn't have a lot of bells and whistles, but it makes up for this with solid content and configurability.

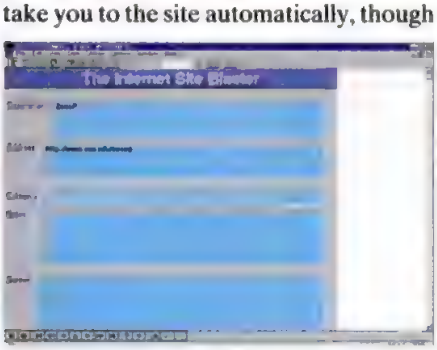
Internet Resources Database 2.0. List price: Registration and databases on-disk, $45; registration only, $22. Martin Bohnet Market Consulting, Huenstetten, Germany; http://www.mbmarktcons.com/ mbmarkt /irdhome.htm. *Circle 498 on reader service card.*

SOLOTECH SOFTWARE

Internet Site Blaster

Internet Site Blaster ($43), from SoloTech Software, is a shareware database program for storing Web-site information. The registered version includes a database of 30,000 sites. The program comes with no documentation and five unnumbered disks. When you look at their contents, you'll find that the disks each contain a single .ZIP file. The installation instructions are inside the .ZIP file on the fifth disk. SoloTech might consider pulling this file out and placing it in unzipped form on the first disk. If you download Site Blaster from SoloTech's Web site, you'll get a single 1.6MB .ZIP file.

Site Blaster has a search facility, but it is nonintuitive to use. Online help, while available, is not context-sensitive. Information in the database about each site is extremely sparse—generally just a one-word description and a URL. The program will not launch your browser and take you to the site automatically, though you can use the Export function to create Netscape bookmarks or Mosaic hot lists. The new version of Site Blaster has a facility for storing graphics, but we were unable to get it to work correctly. We tested the program under Windows 95 and had problems with instability and database corruption. We advise you to look elsewhere for an off-line search tool.



The info in Internet Site Blaster's database is sparse: a keyword and a URL.

Internet Site Blaster 3.0. List price: $43. SoloTech Software, Madison, WI; 800-699-6395; http://www.execpc.com/~wmhogg /share.html. *Circle 499 on reader service card.*

BLUE SQUIRREL INC.

SqURL Pro

SqURL Pro ($119.95) is a suite of seven Windows 95 utilities designed to automate your Internet sessions and minimize the time you spend online. One part of the suite is SqURL (Search and Query Uniform Resource Locators), a cross-engine, online search utility that submits a search to multiple engines, sorts and dedupes the results, and saves them to a .NUT file. Although SqURL doesn't come preloaded with a searchable database of URLs, you will quickly develop these databases as you use it. Be careful not to reuse a database name, however. SqURL will allow it and then crash.

Each .NUT file contains one or more search Subjects, which in turn contain Keyword Searches for each search engine used. Each Keyword Search has an associated set of Results. SqURL displays these three categories of information in a three-paned window. Information about the Searches and Results (Web sites) can be obtained by right-clicking on an item and selecting Properties. Web-site information is limited to title, URL, the search engine that found the site, and some details about when it was found. There is no field for descriptions, and you can not add new search engines.

SqURL Pro is more than just a search facility, and its other components are very useful. Grab-a-Dial lets you use Dial-up Networking in an automated scheduling program, something you can't ordinarily do under Windows 95. The companion utility, Don't Stop, lets the Dial-up Net-

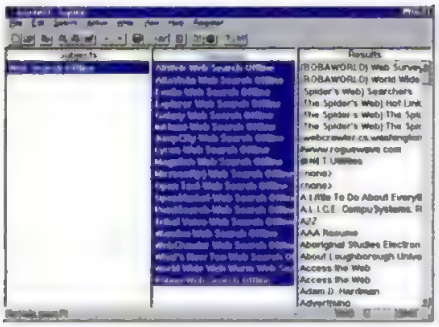
The best Internet search tools access multiple search engines at once and compile the results.

WebCompass, Version 1.0

The best off-line search tools for the Internet have extensive databases with entries organized by topic and augmented with descriptions and searchable keywords. The ability to update the database manually is also extremely useful. This lets you correct errors, enhance descriptions, and add custom keywords. It is also helpful if the tool can access online search engines, which are continuously updated. The best tools access multiple search engines at once and compile the results.

PC MAGAZINE EDITORS' CHOICE

Quarterdeck's WebCompass, our Editors' Choice, offers all these features. Its off-line databases are fairly sparse at installation, but the number of entries can easily jump to several thousand after your first online search. The hot-linked topics database is fully configurable and provides an effective structure for indexing Web resources. Online search results can also be saved to the Archive, which provides a traditional, tree-structured view of the data. Like the topics database, the Archive is fully configurable. The impressive Agent feature builds summaries of the pages found in a search. WebCompass is a powerful tool aimed at comprehensive searching, and if that's what you need, you won't find a better one.



SqURL Pro's three-pane search interface with Subjects, Searches, and Results.

working session run unattended by clicking the Connect button for you. Once connected, you can use SqURL to search the Web, Grab-a-Site to capture part of the Web to your hard disk, and SendMail to activate Exchange with a script-enabling command line. Hang-It-Up hangs up the phone for you when you're done, and it's handy for automated scripts and for starting a download and going off to the movies.

SqURL Pro won't help you organize your bookmarks, but it can help you locate resources on the Web, and it comes with a suite of useful utilities.

SqURL Pro. List price: $119.95. Blue Squirrel Inc., Salt Lake City, UT; 800-403-0925, 801-484-2225; fax, 801-484-2229; http://www.bluesqirrel.com. *Circle 500 on reader service card.*

QUARTERDECK CORP.

WebCompass

WebCompass 1.0, from Quarterdeck Corp., lets you search both online and off-line. Priced at $139, it is by far the most powerful search tool in this roundup. In addition to a search-and-retrieval engine, the product includes three other components: the Quarterdeck Mosaic browser, Quarterdeck WebServer, and the local Web pages that make up the search engine interface. URLs are stored in Mosaic's Archive database, which uses a tree structure similar to Explorer's. WebCompass also works with third-party browsers.

The Archive display can be toggled on or off with a button press, and it consists of four tabbed pages: Hotlists, Global History, Local History, and Link Tree. The Hotlists are an editable set of URLs organized by topic. Over 500 URLs come preloaded in a hot list. You can add to the list or create a new one. You can import URLs from Netscape, NCSA Mosaic, or HTML files. The Global History page lists all the sites you've visited. The number of days before a link expires and the number of links saved can be set in the Preferences dialog box. The Local History page shows you where you've been during the current session. The Link Tree organizes the Local History hierarchically, so you can see at a glance how the links are related to each other. To view a URL on any of the four pages, simply click its icon.

WebCompass is a complex program, but it rewards you with extraordinarily powerful tools for retrieving, organizing, and storing information.

The central feature of WebCompass is its enhanced search-and-retrieval engine. WebCompass can search multiple online databases, then organize and summarize the information it finds. This is time-consuming, but it can be done in the background while you perform other tasks. You can speed things up by selecting only relevant search engines, or *resources*. Resources are grouped by type (General or Media, for example), and the types are configurable. You can also add new search engines. When a search is done, you can save the results to the Archive.

The search engine interface, WebCompass Editor, is written as a set of HTML documents and CGI scripts. It requires Quarterdeck WebServer to run. The simplest way to search is to type in keywords, select the resources to use, and click Search. This will return a list of documents with any duplicates already removed.

The easiest way to perform a search is

WebCompass uses Weblike HTML documents as interfaces to its search engine.

to start by looking in the topics database for the subject of interest. Each topic record includes the topic name, topic type (for example, thing or person), definition, query terms, and search resources to use. The query terms include alternative spellings and synonyms, and ensure the broadest search possible. You can edit the information in a topic record, and you can add new records. When you find the topic you want, click on Activate Inactive Topic and return to the WebCompass Editor. You'll see the topic on the Active Topic list.

To begin a background search of the Internet resources you've selected, you click Start Agent. The Agent will compile a list of the sites it finds, automatically create summaries, and link the information to the topic database. As you work with WebCompass, the topic database becomes filled with associated Web sites. We encountered some stability problems when doing background searches of the Web. The system would sometimes freeze and crash after switching to another program. There were also some redraw problems in the WebCompass Editor.

WebCompass is a complex program, and you'll have to spend some time to get comfortable with it. But once you do, you'll be rewarded with an extraordinarily powerful tool for retrieving, organizing, and storing information from the Web. The more you use it, the more completely you'll be able to command the subjects that interest you. □

WebCompass 1.0. List price: $139. Quarterdeck Corp., Marina Del Rey, CA; 800-683-6696, 310-309-3700; fax, 813-523-2335; http://www.qdeck.com/. *Circle 501 on reader service card.*

My name is Joan

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My friends, last month

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Internet Plug-Ins And Helpers

We pick the top 30 helper apps and Netscape Navigator plug-ins. *By David Lidsky, Thomas Mace, Michael W. Muchmore, and Eyal Rabinovitch*

Audio

Cool Edit 95
Syntrillium Software Corp., Phoenix, AZ; 602-941-4327; fax, 602-941-8170
http://www.syntrillium.com
Cool Edit 95 is a powerful sound editor, with professional-level features, that you can set up as your browser's audio player. Its capabilities may be overkill for simply tuning in the sounds of the Web, but if you're interested in graphically manipulating sound in a large number of audio formats, it's a wonderful tool. You can try out all of its features for free, but shareware registration is required for permanent use.
Price: Shareware registration, $50.

Internet Wave 1.0
VocalTec Inc., Northvale, NJ; 800-843-2289, 201-768-9400; fax, 201-768-8893
http://www.vocaltec.com
The free Internet Wave 1.0 audio player is a well-designed helper application for accessing Internet Wave audio, one of the Web's handful of streaming-audio formats. The other Internet Wave components—an audio encoder and a server component—are also free, making this a great way to experiment with audio on your site. The Internet Wave codec, derived from the company's Internet Phone product, is well suited to delivering music over a low-bandwidth connection. Internet Wave is available for Windows 3.1, Windows 95, and Windows NT.
Price: Free.

MidiGate 6.1.4
PRS Corp., Hong Kong; 852-2543-7773; fax, 852-2541-9843
http://www.prs.net/midigate.html
MidiGate 6.1.4, a 16-bit Windows application, is an ingenious helper application that lets your browser play MIDI files accessed through links on Web pages. This unobtrusive player will let you start, stop, reposition the file pointer on the fly, loop your selection, and save or play a local copy of the MIDI file. The PRS site boasts a huge archive of classical-music MIDI clips. MidiGate requires VBRUN300.DLL, which you can download from the site.
Price: Shareware registration, $10.

RealAudio 2.0b2a
Progressive Networks Inc., Seattle, WA; 800-230-5975, 206-447-0567; fax, 206-223-8221
http://www.realaudio.com
Probably the Web's best-known audio format, RealAudio is a sophisticated and powerful streaming-audio technology that can deliver sound to hundreds of users simultaneously over Internet connections as slow as 14.4 Kbps. The RealAudio encoder and server are heavy-duty and expensive, but the elegant player, a Netscape Navigator plug-in, is available free from the company's Web site. You'll find tons of RealAudio entertainment on the Web, from live news to 50-year-old radio broadcasts of "Superman." The RealAudio player is available for Mac OS, Unix, Windows 3.1*x*, and Windows 95 (and is Windows NT–compatible).
Price: Free.

ToolVox Web Player
Voxware Inc., Skillman, NJ; 609-497-1212; fax, 609-497-2490
http://www.voxware.com
ToolVox for the Web is a speech-oriented audio technology that can stream clear sound across the Internet through incredibly low-bandwidth connections—as slow as 2,400 bps. The Web player, a Netscape plug-in, offers a slick trick we've seen nowhere else: the ability to speed up and slow down the rate of playback. The Web player is available for Mac OS, Windows 3.11, and Windows 95.
Price: Free.

TrueSpeech Player
The DSP Group Inc., Santa Clara, CA; 408-986-4300; fax, 408-986-4323
http://www.dspg.com/
The DSP Group's TrueSpeech Internet offers a zero-cost path to putting high-quality streaming audio on your Web site. TrueSpeech Player is a free download, and the encoder is built into the Windows 95 Sound Recorder. The TrueSpeech Player is available for Mac, PowerMac, Windows 3.1*x*, Windows 95, and Windows NT.
Price: Free.

Graphics

Acrobat Reader 2.1
Adobe Systems Inc., Mountain View, CA 800-628-2320, 415-961-4400; fax, 415-961-3769
http://www.adobe.com/Acrobat
As a helper application to your Web browser, Acrobat Reader lets you view Portable Document Format (PDF) files posted on the World Wide Web. You need to download the documents before viewing. Acrobat Reader preserves the integrity of typefaces and graphics in a document and ensures that the formatting will not be altered during printing. PDF files feature cross-platform compatibility, so Acrobat Reader will work across many systems. A number of plug-ins are available for Acrobat Reader, including one to play QuickTime or AVI movies.
Price: Free.

Acrobat Amber Reader
Adobe Systems Inc., Mountain View, CA; 800-628-2320, 415-961-4400; fax, 415-961-3769
http://www.adobe.com/Amber
Acrobat Amber Reader is a Netscape Navigator 2.0 plug-in that allows users to view and navigate PDF files directly in their browsers. Amber Reader is a beta version of what will be released in the middle of this year as an update to the Acrobat product line.
Price: Free.

Astound Web Player 1.0
Gold Disk Inc., Santa Clara, CA; 800-982-9888, 408-982-0200; fax, 408-982-0298
http://www.golddisk.com/
Gold Disk's Astound Web Player (AWP) is a utility that lets you view multimedia content created in Astound and Studio M presentations directly in your Netscape Navigator window. If you have another browser, AWP loads as an external viewer. Clicking on a project hyperlink downloads the presentation gradually, before your eyes. First, the background appears, followed by graphics, sound, animation, and any video. AWP also supports interactive command buttons.
Price: Free.

Envoy Plug-In for Netscape Navigator 2.0
Tumbleweed Software Corp., Redwood City, CA; 415- 363-7022; fax, 415-363-7024
http://www.twcorp.com/
Envoy Plug-In for Netscape Navigator lets you view Envoy documents directly within your browser, eliminating the need for a separate Envoy viewer. Envoy is an electronic publishing format that delivers document portability in a cross-platform environment while maintaining a consistent look. Envoy boasts smaller files and less memory use than Acrobat documents. Envoy documents include a navigation toolbar and support right-mouse-button functionality.
Price. Free.

Fractal Viewer
Iterated Systems Inc., Atlanta, GA; 404-264-8000; fax, 404-264-8300
http://www.iterated.com
Fractal Viewer lets you view and manipulate Fractal Image Format (FIF) files, a compressed format that eats less bandwidth than other image types. Fractal Viewer downloads an image progressively: First you see a thumbnail, which gradually grows to a full-screen, full-resolution image. Image manipulation features can be accessed through right-mouse menus, and you can do everything from altering color to flipping and rotating. Iterated Systems makes Fractal Viewer available as a plug-in for Netscape Navigator 2.0 and as a helper application for other browsers.
Price: Free.

NCompass OLE Control Plug-In 2.0
NCompass Labs Inc., Vancouver, British Columbia, Canada; 604-606-0950; fax, 604-606-0970
http://www.excite.sfu.ca/NCompass/
The NCompass plug-in allows OLE controls to work inside Netscape Navigator 2.0 and Internet Explorer 2.0. Developers can embed OLE controls in standard HTML pages, and the controls execute in the browser when the page is retrieved. OLE controls provide an interesting method of putting interactive multimedia on your Web page, one that should become more prevalent this year. The Excite Center home page offers some intriguing demos including a multiplayer game and 3-D graphics. NCompass is available only for Windows 95.
Price: Free.

Shockwave for Director
Macromedia Inc., San Francisco, CA; 800-470-7211, 415-252-2000; fax, 415-626-0554
http://www.macromedia.com/Tools/Shockwave
Macromedia Director has long been known as a premier multimedia authoring tool, and Shockwave for Director, a Netscape Navigator plug-in, now lets developers put Macromedia Director content directly into their Web pages. When you access a Shockwave page, the Director content—sound, video, animation, and interactive features—executes right inside the page. Some of the Web's most exciting multimedia content is based on Shockwave, so don't miss the wave.
Price: Free.

Video

CoolFusion 1.4b
Iterated Systems Inc., Atlanta, GA; 404-264-8000; fax, 404-264-8300
http://www.iterated.com
Iterated Systems complements its Fractal Viewer with CoolFusion, a Netscape plug-in, which lets you explore audio, video, and animation on the Web. CoolFusion lets you view a file as it is being downloaded, for a near-streaming effect. CoolFusion does not give you the choice of downloading the clip directly, and high-quality viewing means keeping the image

small. Still, CoolFusion is a very promising product in the race for real-time, low-bandwidth multimedia on the Web.
Price: Free.

MediaSauce 1.1
FlatCracker Software, Lindon, UT;
801-785-7082
http://www.flatcracker.com
The shareware version of FlatCracker's MediaSauce is a multimedia viewer that not only supports audio (MIDI and .WAV) and video (.AVI and .MOV) files but will even control your CD-ROM drive. The viewer, which is available for Windows 3.1 and Windows 95, is somewhat slow to initialize, especially when playing video, and it lacks support for MPEG playback. But if you can live with its overly hip kinetic interface, you'll find that its strong control functionality and high-quality audio and video playback make it an excellent choice for multimedia viewing.
Price: Registration, $19.95.

NetToob 2.03b
Duplexx Software Inc., Salem, MA;
800-321-7144, 508-741-5500; fax, 508-741-2543
http://www.duplexx.com
NetToob is a multimedia player whose ability to play many of the standard digital video formats on the Web (MPEG, QuickTime for Windows, and Video for Windows) is a plus for the Web surfer who wants an all-in-one viewer. Although it's missing some perks like a slider bar for moving through the file and a resizable screen, NetToob's audio and video quality are a match for those of many viewers that handle a only single format. NetToob features a screen-saver element that will play a downloaded video when your computer is idle, and Duplexx Software promises an upgrade, NetPipe, to support streaming MPEG-1 audio and video over the Net.
Price: Registration, $14.95.

PreVu
InterVu Software, Rancho Santa Fe, CA;
intervu@intervu.com
http://www.intervu.com
PreVu is a Netscape plug-in MPEG player, which unlike other video plug-ins lets you look at the first frame before you commit to a full download. If you decide to go ahead, you can either download and play the file for viewing with any MPEG player or else view the download as it happens, for a near-streaming effect. PreVu, currently in beta, is free for downloading; InterVu Software has announced plans for incorporating audio in the near future.
Price: Free.

QuickTime for Windows 2.1.1
Apple Computer Inc., Cupertino, CA;
800-282-2732; fax, 716-871-6511
http://quicktime.apple.com
QuickTime for Windows, the video component of Apple Computer's QuickTime multimedia products for the Web, delivers clear sound and high-quality, resizable images. You can't preview your video clip or view it during downloading, but QuickTime does give you an easy-to-use control interface with volume, rewind, and fast-forward controls and a slider bar to restart the file at any point.
Price: Free.

StreamWorks
Xing Technology Corp., Arroyo Grande, CA;
805-473-0145; fax, 805-473-0147
http://www.xingtech.com
StreamWorks is one of the new products currently offering true streaming video across the Internet. What makes StreamWorks unique is its ability to provide real-time encoding and transmitting across the Web to StreamWorks clients. The free StreamWorks player typically delivers a very slow frame-rate over anything slower than ISDN, but the picture quality remains high. It can function independently of your browser and lets you surf the Web for active StreamWorks video sources. The same player can be used to hear StreamWorks streaming-audio sources.
Price: Free.

VDOLive
VDOnet Corp., Palo Alto, CA;
415-846-7700; fax, 415-846-7900
http://www.vdolive.com
VDOLive, like StreamWorks, provides true streaming video and audio for the Internet. You'll need ISDN or better for this to be more than an interesting technology demo, however. The free player, which can act as a Netscape 2.0 plug-in or a helper, looks sharp, but it's missing a slider bar for repositioning the pointer. The encoder is built to support as many as 100 simultaneous streams.
Price: Free.

VMPEG Lite
Stefan Eckart
ftp://papa.indstate.edu/winsock1/Windows95/Graphics/vmpeg17.exe
VMPEG Lite is a basic, easy-to-use viewing tool that supports only MPEG video files. Although it is missing a slider bar and other user controls, its video playback quality is among the best we've seen. VMPEG Lite offers both video and audio, something which other MPEG-only players often lack. Playback is snappy, and you can freely size the viewing screen without risking loss of video quality.
Price: Free.

Virtual Reality

CyberGate 1.0 Beta 1
Black Sun Interactive, San Francisco, CA;
415-263-6836
http://www.blacksun.com/
This VRML browser can be used either as a standalone viewer or as a Netscape plug-in. It spawns the external viewer when a .WRL link is accessed. Black Sun worlds are enhanced for interaction with other users by avatars, chatting, threaded conversations, and cards that describe users. Point-and-drag or keyboard navigation is facilitated by constraints that don't let you go through walls or beneath floors. CyberGate supports sound effects, nested WWWInline nodes, and background images. The installation file is a hefty 3.8MB; CyberGate is available for Windows 95 and Windows NT.
Price: Free.

CyberPassage Beta 2
Sony Corp., Japan;
http://sonypic.com/VS-E/vstop.html
CyberPassage adds moving objects, sound, and 3-D animation to the VRML 1.0 model. A Netscape helper app, CyberPassage's well-designed interface sports a navigation toolbar, a scouter, a jumping eye, and bookmarks. The download file weighs in at 3.3MB, and the browser requires a reasonably fast PC running Windows 95.
Price: Free.

Fountain Beta 5
Caligari Corp., Mountain View, CA;
415-390-9600; fax, 415-390-9755
http://www.caligari.com
Fountain is both a browser and a rapid modeler of 3-D worlds. Configurable as a Navigator helper app, it doesn't offer strong navigation features, but its authoring capabilities shine. You can easily grab an object from a world and put it in your own. To comfortably navigate through worlds with more than a couple of thousand polygons, you should have a Pentium PC, 16MB of RAM, a video card with 3DR hardware acceleration, and a 28.8-Kbps or faster connection to the Internet. The download file is 3.2MB. Fountain works under Windows 3.1 or Windows 95.
Price: Free.

Netscape Live3D
Netscape Communications Corp., Mountain View, CA;
415-528-3777
http://www.netscape.com
Netscape Live3D is a VRML plug-in from the premier Web browser vendor. Live3D offers distributed, interactive 3-D spaces with text, images, animation, sound, music, and video. It extends Netscape's Java, JavaScript, and plug-in interfaces to make it easy to develop distributed 3-D applications. Live3D is based on the proposed Moving Worlds VRML 2.0 specification.
Price: Free.

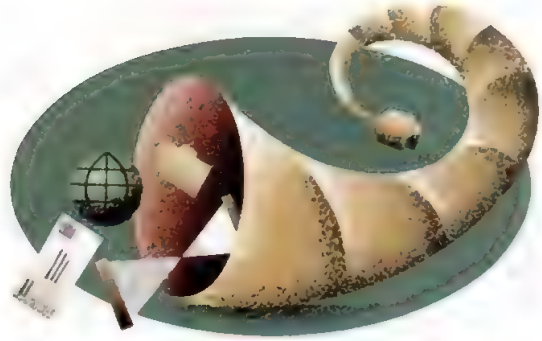
QuickTime VR Player
Apple Computer Inc., Cupertino, CA;
http://qtvr.quicktime.apple.com/
QuickTime VR Player is a standalone application that lets you navigate QuickTime VR virtual worlds. These are intriguing panoramic environments, typically created from digitized photographic images. QuickTime VR worlds appear in the player window, but you can explore them through 360 degrees using arrow keys or a mouse. QuickTime VR Player, available for the Mac, Windows 3.1, and Windows 95, is an extension to the QuickTime video player, which you specify as a helper app in your Web browser.
Price: Free.

VRealm
Integrated Data Systems Inc., Savannah, GA;
912-236-4374; fax, 912-236-6792
http://www.ids-net.com
A plug-in for Netscape 2.0 or a standalone application, VRealm displays in the Web browser's window. Integrated Data Systems claims full VRML 1.0 compatibility and high dependability, color performance, and speed. VRealm offers three modes of movement (walk, fly, and model), dual-mouse control, jump to, a headlight feature, and the ability to switch between linked worlds without exiting the program. The company recommends at least a Pentium 90 with 16MB of RAM; the download file is 2.5MB.
Price: Free.

VRML Add-In 2.0 for Internet Explorer
Microsoft Corp., Redmond, WA;
800-426-9400
http://www.microsoft.com
This VRML plug-in for Microsoft Internet Explorer 2.0 displays VRML content inside a browser window. Navigation is snappy, featuring Walk, Slide, Tilt, and Spin buttons to modify joystick, keyboard, or mouse operation, and there's a Walk Through Walls menu toggle. VRML Add-In supports ASCIIText nodes, ShapeHints, improved lighting, background download, texture mapping, collision detection, object manipulation, and dynamic clipping-plane adjustment. A 1.9MB download, VRML Add-In requires Windows 95, Microsoft Internet Explorer 2.0, and a fast PC.
Price: Free.

WIRL
VREAM Inc., Chicago, IL;
312-477-0425; fax, 312-477-9702
http://www.vream.com
WIRL is a high-power, extended-VRML plug-in for Netscape that displays right in the browser window. Buttons for moving, rotating, and positioning camera view assist mouse-drag navigation. WIRL supports realistic texture mapping, animations, and multiple light sources. VREAMScript extensions let you do things like launch a phone dialer or play a sound by clicking the mouse on the appropriate object. WIRL runs on Windows 95 and Windows NT, and the download file is 3.1MB. A commercial version is available for $29, including upgrades for a year.
Price: Free.

WorldView 0.9G
Intervista Software Inc., San Francisco, CA;
415-434-8765
http://www.intervista.com
WorldView is a standalone VRML 1.0–compliant browser with extensions for perspective, collision detection, clipping-plane adjustment, GZIP compression, background colors, standalone HTTP access, and messaging. Using OLE, WorldView will start Netscape if an HTML link is accessed. The download file is 1.7MB. We found the pre-beta version to be quite unstable, so don't be surprised if you experience runtime errors. WorldView is available as a Windows 3.1 Win32s application, or for Windows 95 and Windows NT.
Price: Free.



MORE INTERNET UTILITIES

FROM FILE-TRANSFER PROGRAMS TO CYBER CENSORS, WE TEST A GRAB BAG OF PRACTICAL INTERNET TOOLS. MOST ARE AVAILABLE STRAIGHT FROM THE WEB.

By Padraic Boyle, Jay Munro, Rick Rovegno, and Larry Seltzer

The Internet has produced more than its share of useful and powerful utilities. We look at four of the most important categories. FTP clients let you log onto a remote FTP server to transfer or manage files. Screening and filter utilities give parents a tool for keeping their children from accessing Internet content they find objectionable. Time keepers and monitors provide a handy way of tracking the connect time you're paying for. Finally, uuencoders decipher the binary-to-text encoding techniques used to transfer binary data through text-only vehicles like e-mail.

For the commercial products reviewed here, we indicate the usual pricing and contact information. For shareware and freeware, contact information is often incomplete or unavailable. In those cases, we have supplied at least the author's name and a known download site at press time. The reviews that follow, based on hands-on testing, will get you up to speed on what these utilities are built to do and which ones offer the best results.

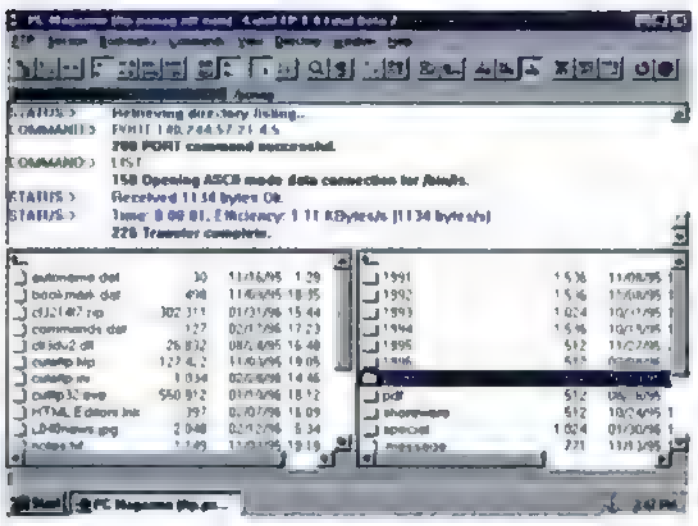
FTP CLIENTS

BY JAY MUNRO

File Transfer Protocol (FTP) utilities are built for transferring files between local clients and remote FTP servers, and for remotely managing files and directories for those servers. You can use them for everything from casual downloads to serious Web-site maintenance. The difference between utilities meant for casual use and those designed for professionals lies in the details of the available customization options and file management convenience features.

CuteFTP, Version 1.4, a $30 shareware utility available in 16-bit and 32-bit Windows versions, is the most comprehensive of the packages reviewed here. Niceties like the ability to filter files on both local and remote directories, and convenience features like group select, deselect, and invert selection, make it an ideal tool for serious site maintenance. It comes preloaded with 36 connection profiles arranged in a folder hierarchy. You can add your own profiles through a single screen where you specify host name, user ID, password, port, delay, retry, and firewall information, as well as log-on type (normal or anonymous), transfer type, and a multiline comment.

Online, you work with side-by-side local and remote directories. To transfer files, you can drag and drop, double-click, or use the Download or Upload buttons. CuteFTP's one drawback is support,



CuteFTP's file management niceties make it a natural for site management.

which is currently available only through e-mail. (Alex Kunadze; 800-242-4775; fax,713-524-6398;http://papa.indstate.edu/winsock-l/FTP/CuteFTP.Betas.)

Designed to handle most standard FTP tasks, **FTP Icon Connection 2.2** ($25) is an attractive Windows 95 shareware application that shows great promise but was not fully stable in testing.

If you're comfortable with Explorer windows in Windows 95, you'll feel at home with FTP Icon Connection's interface. The package comes with ten preloaded FTP connections, which are displayed as large icons in the program's main window. You can add your own connections using a simple Connection Wizard where you enter the host name, user ID, password, initial host, and local directories.

The package displays remote files and directories as icons or folders. When you're inside a directory, you can use right-mouse menus to open or close a connection, delete a file, create a folder, and upload or download a file. You can also examine properties like the name, date, or size of a file, directory rights, and owner and group rights to a file.

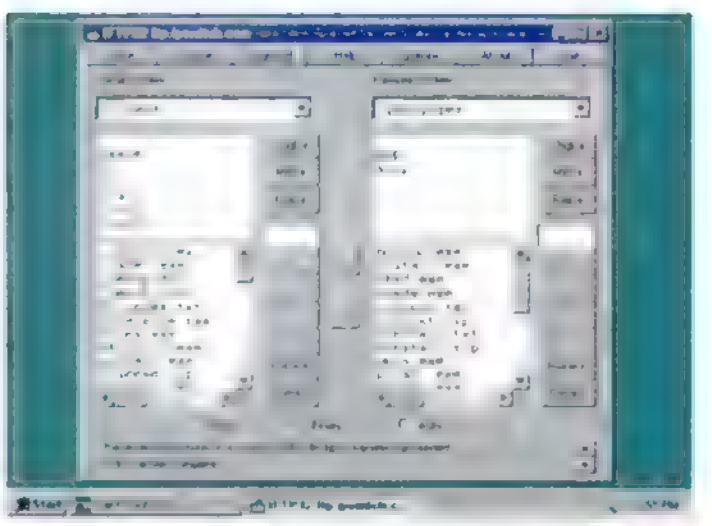
Unlike most FTP utilities, FTP Icon Connection lacks a second window, so you can't see local and remote directories simultaneously, but you can drag and drop files between its main window and the Windows 95 Explorer. (J-Technology Inc., Athens, AL; 205-232-5559; fax, 205-883-1873; http://www.jtec.com. *Circle 482 on reader service card.*)

Integrated Internet FTP, Version 1.1.0 (IIFTP), is a $25 FTP utility that's easy to set up and use, and it provides most of the features you'll need. IIFTP's screen layout puts the local directory on top and the remote directory on the bottom with a two-line status display in between. At the bottom of each directory view are buttons to execute all the basic FTP commands. It does not support drag-and-drop.

You can set up connections quickly with the Profile configuration screen where you enter your filename, host name, user ID and password, local and remote directories, and firewall information. A useful IP smart caching feature lets you store the IP number for a site, cutting DNS overhead when you make the connection.

Integrated Internet FTP also comes with a personal FTP server intended for local file transfers. The IIFTP client and server both support PASV connections, where the client rather than the server is forced to open the data connections, obviating some firewall connection problems. (Kent D. Behrens, Waco, TX; 817-751-1554, or Aquila Internet Services Inc., Aurora, IL; 708-820-0480; fax, 708-820-8813; http://www.aquila.com/ kent.behrens/. *Circle 483 on reader service card.*)

Elementrix Technologies' **POTP Secure FTP 1.52** is a $198 FTP bundle that includes



IFTP32 is the commercial sibling of the elegant (and free) WS_FTP32.

both a Windows 3.1 client and a local FTP server. Its most unusual feature is its ability to perform encrypted transfers.

The Secure FTP client looks and feels like the Windows 3.1 File Manager, with menu selections added for network and security features. Buttons are provided to copy, move, rename and delete files and directories, as well as to encode, decode, connect, and disconnect. You can upload and download through drag-and-drop.

Saved connection profiles include the FTP host name, user, password, and local

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and remote directories. You can change the port setting and pick among a comprehensive list of connection protocols including Chameleon, generic DOS/Windows, Secure FTP, Unix, and Windows NT. To use the secure features, you must be connecting to a Secure FTP server. For corporate applications, a Unix version of the server is available for $2,500. (Elementrix Technologies Inc., New York, NY; 800-711-6606, 212-888-8879; fax, 212-935-3882; http://www.elementrix.co.il/. *Circle 484 on reader service card.*)

WS_FTP32 proves that some of the best things in life are still free. This popular and elegant freeware package for Windows 95 and Windows NT covers most needs. Commercial sites must license Ipswitch's $45 IFTP 32, a commercial sibling.(Ipswitch Inc., Lexington, MA; 617-676-5700; http://www.ipswitch.com.)

WS_FTP32's interface shows local and remote directories side by side. To transfer files, you double-click on a file or press the appropriate arrow buttons when the file is highlighted. WS_FTP32 supports all the standard file commands, plus PASV.

WS_FTP32 comes with 23 preset FTP sites, and you can easily add more through the nonintimidating Session Profile screen. If you are new to FTP, the first screen gives you all the information you need including name, host, user ID, password, and account ID if needed. The second screen lets more advanced users edit the port, the retry, time-out, and initialization commands, and firewall information. (John A. Junod, Martinez, GA; http://www.csra.net/junodj/default/htm; junodj@csra.net.)

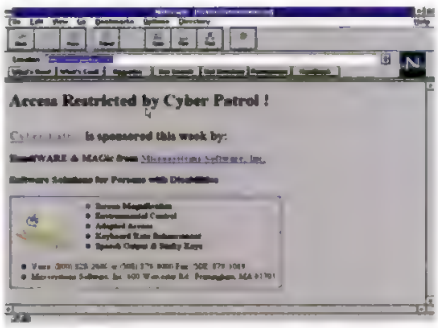
SCREENING AND FILTERING UTILITIES

BY PADRAIC BOYLE

Net filters give parents the tools to shield children from the adult-oriented subject matter that proliferates on the wild side of the Internet. Because the Internet is growing so quickly, it's difficult for Internet filtering products to keep up. Net filters don't promise to block 100 percent of the objectionable materials out there, but they do provide admirable coverage. We review six Net filtering programs in this roundup.

Microsystems Software's **Cyber Patrol** ($49.95 list price, including six months of CyberNOT updates) provides an excellent solution for parents wishing to police their children's Internet use. Cyber Patrol created its CyberNOT Block List screening database by heeding the baser interests of the average 12-year-old. The CyberNOT Block List is broken up into categories, giving parents the flexibility to enforce restrictions based on their own values. Parents can also deny access to sites not included in the CyberNOT Block List. You can download and test-drive a free Home Edition, which expires after a seven-day trial. (Microsystems Software Inc., Framingham, MA; 800-489-2001, 508-879-9000; fax, 508-626-8515; http://www.cyberpatrol.com. *Circle 502 on reader service card.*)

Solid Oak Software's **Cybersitter** ($39.95 list; filter-list updates, free) relies on a filtering list made up of terms, phrases, Web and FTP sites, and newsgroups to

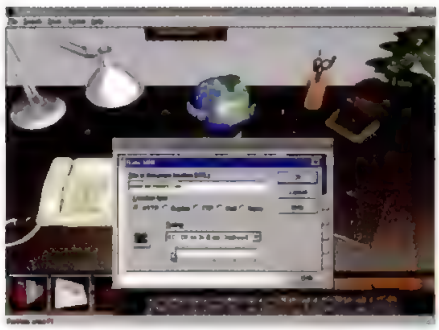


Cyber Patrol knows when you've been naughty and displays this message.

block undesirable material. Cybersitter blocks words or phrases by the context in which they appear, not just by the word or phrase alone. Words and phrases can be removed from the page without restricting access to the whole page.

When an unauthorized user attempts to access a restricted site, Cybersitter can be configured to block, block and report, or just report the violation to a database that only the parent can access via password. A trial version of Cybersitter can be downloaded from Solid Oak's Web page. (Solid Oak Software Inc., Santa Barbara, CA; 800-388-2761, 805-892-2550; fax, 805-967-1614; http://www.solidoak.com/cybersit.htm. *Circle 503 on reader service card.*)

InterGO ($49.95 direct), from InterGO Communications, excels in the integration of Internet and other tools into an easy-to-use interface for limiting access to



InterGO integrates KinderGuard and other Internet tools right on your desktop.

certain Internet sites. InterGO includes a Web browser, search engine, e-mail, FTP, telnet, news reader, spell-checker, and virus scanner.

KinderGuard, InterGO's screening module, uses a default database of well-known objectionable sites, blocking access based on the site's age-group rating and the user's ID. Parents can enter specific sites or newsgroups to add to KinderGuard's database. They can also create separate log-on IDs with different access ratings for individual users. KinderGuard's ratings classification by age group, however, does not allow for site-by-site approval or restriction for each user. KinderGuard does not offer any reporting capabilities, nor can you filter out words or phrases. InterGO is currently available only in a Windows 95 version. (InterGO Communications Inc., Plano, TX; 214-424-7882; fax, 214-424-5503; http://www.intergo.com. *Circle 504 on reader service card.)*

NewView's **iscreen!** (one year, $39.95 direct) proactively rates the content of sites on their levels of sex, violence, and 11 other criteria to create its SafeSites. The SafeSites concept allows access only to Web pages that have been rated by NewView. NewView projects that over 1 million sites will be rated within the year, and you can add unreviewed Web sites to your approved access list locally.

Parents create user profiles using a log-on ID to personalize access for each of their children. The profiles are compared with the SafeSites database to check each child's access level. If someone attempts to disable iscreen!, the parent is notified, and access to the Internet is denied. A copy of iscreen! is available from NewView's Web page. (NewView

Inc., Redwood City, CA; 415-299-9016; fax, 415-299-0522; http://www.newview.com. *Circle 505 on reader service card.)*

Net Nanny, from Trove Investment Corp. ($49.95 list; dictionary updates, free), features a unique search engine that monitors, screens, and blocks data as it is being accessed by any application running on your computer. Net Nanny's install and setup are DOS-based, however, and easily accessible to any knowledgeable user, including your computer-savvy child. Net Nanny's next version, due out by the time you read this, will feature Windows-based installation and setup.

To monitor applications, Net Nanny uses a dictionary of user-definable words and phrases deemed inappropriate, and it keeps track of words or phrases in violation. Net Nanny creates an audit trail to allow parents to see the number of violations and the offending words or phrases used. In addition to blocking inappropriate data from being accessed from your computer, Net Nanny's dictionary blocks information such as credit card numbers from leaving your computer. (Trove Investment Corp., Vancouver, British Columbia, Canada; 800-340-7177, 604-662-8522; http://www.netnanny.com/netnanny/. *Circle 506 on reader service card.*)

SurfWatch ($49.95 direct; monthly updates, $5.95), from SurfWatch Software, provides the power to block access to material on Web and FTP sites, Gopher, and chat lines, but it lacks many features essential to comprehensive monitoring.

SurfWatch comes with more than 2 thousand sites in its blocking database. But parents cannot customize the database, and SurfWatch does not offer individual IDs for different household users. To access a site that is being blocked, you must disable SurfWatch, and there are no monitoring or reporting capabilities available for parents. (SurfWatch Software Inc., Los Altos, CA; 800-458-6600, 415-948-9500; fax, 415-948-9577; http://www.surfwatch.com. *Circle 507 on reader service card.)*

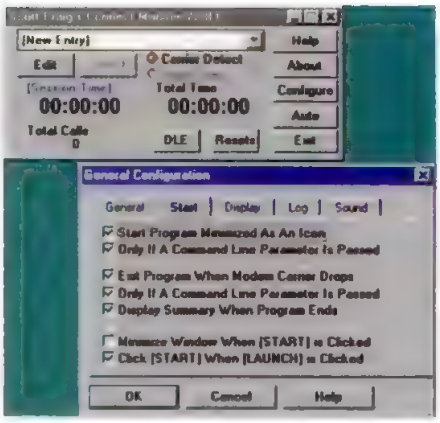
TIME KEEPERS AND MONITORS

BY JAY MUNRO AND RICK ROVEGNO

Time is money, and that's what time keepers and monitors are all about. These utilities help you keep track of your expensive online connection time. They can be triggered by your modem's carrier detect (CD) signal, or by manual or programmatic control. The main differences among the utilities reviewed here lie in their launching methods, logging capabilities, alarm features, and ability to perform cost calculations.

Communication Connect Time Monitor 2.8.6 (CCTM) is an attractive freeware package by Scott Craig that's loaded with features. Monitoring can be triggered automatically from the COM port or manually by a Start/Stop icon (script-based startup is not available). Once CCTM is active, an icon shows you either the total number of calls made when you're off-line or the elapsed or session time when you're connected. You can configure alarms for total-time, prime-time, daily-time, or session-time limits; you have the option to attach a .WAV file to the warning as well. The package works with both dial-up and LAN connections.

You have a choice of per-session, daily, monthly, or user-definable logging options. Neat perks include the Download Estimator, which gives you an idea of how much a download will cost, and the Carrier Delay, where you can enter a delay to compensate for the time taken between carrier detect and actual log-on. CCTM's automated setup and its clear, concise documentation will have you up and running quickly. (Scott Craig, Nashville, TN; 615-331-1131; http://tucows.myriad.net/softtime.html.)



Communication Connect Time Monitor watches connect time so you don't have to do it.

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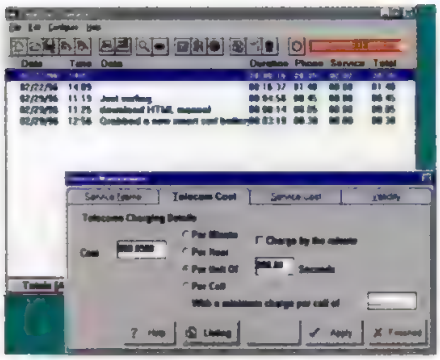


SmartSurf's smart interface helps you monitor online charges.

Log Tick 3.1, a $25 shareware package by Ton Martens, displays as an icon while you're online, but rather than tracking time, it shows accruing costs. Given Log Tick's context-sensitive help, its cost calculation methods were easy to access and understand. We found Log Tick initially difficult to install; once configured though, it worked fine. You can configure it to start manually, from a Carrier Detect signal, or with a script. It also lets you calculate costs for multiple Internet service providers. Log Tick's tracking and logging abilities were good, but it was somewhat too easy to reset and lose information accidentally. The registered version of the package lets you configure alarms to play your favorite .WAV files. (Ton Martens, AC Heemskerk, The Netherlands; http://www.pi.net/~tmartens/logtick.htm.)

Net Clock 4.6, a $15.50 shareware utility by David W. Yutzy, is a flexible timer system that is easy to set up and use. You can choose to launch it manually, automatically by carrier detect, or through Winsock activity. Installation is simple—just unzip the distribution file into a directory—and the online help is clear and accurate. A status screen displays the method of billing, cost, and time. When minimized, it displays time and cost. On the downside, the product requires Winsock to be accessible when set up, and it lacks a configurable alarm. (David W. Yutzy; 800-999-2734 (orders only); http://www.terminus.com/~dyutzy/netclock.html.)

Online Time Tracking Program 1.0, by Richard D. Pollett, is somewhat limited compared with many of the other products reviewed here, but it has the benefit of being freeware. It lets you track a wide variety of information on a single screen and provides an icon for minimized viewing. But it has limited logging capabilities and lacks both online cost calculation and configurable alarms for specific events. You can configure Online Time Tracking Program to launch multiple services from a row of icons, available when the program is maximized. Online Time Tracking Program offers the choice of launching manually, via script commands, or automatically with carrier detect. Overall we found the program difficult to set up and use. (Richard D. Pollett; fax, 904-365-2116; http://gfnl.genesee.freenet.org/tucows/files/olttp.zip.)

SLIP db 1.01 is a $22 shareware timer utility by Derrick R. Webber that is designed to be launched through external log-on scripts. The product gives general guidelines for script writing, but it offers no examples for major online services. It cannot launch a session manually or via carrier detect. To use SLIP db with Windows 95 requires the scripting tool from Microsoft Plus! The package offers limited built-in cost calculations. Information from the log file can be copied to the Clipboard in tab-delimited form for pasting in a spreadsheet or word processor. SLIP db does not have alarm capabilities. (Webber Technical Services, Ottawa, Ontario, Canada; http://www.achilles.net/~dwebber.)

SmartSurf 1.20 is an attractive freeware program, complete with icon bar, tool tips, and a Microsoft Office–like toolbar mode. Sessions are triggered by the modem's carrier detect, or you can launch them manually. SmartSurf cannot be started from a script. At the end of each session, a dialog box pops up, so you can enter a comment. Log records can be added, deleted, or edited on the fly. SmartSurf allows extensive configuration, with tabbed dialog screens for service, application (covering browser, e-mail, and FTP clients), and modem information. A downside is that you are forced into a rather strict input format on the configuration screens (you must enter 000.100 for 10 cents, for example). Log files can be exported either by copying them to the Clipboard or via a comma-delimited file (.CSV) that can be imported into a spreadsheet or database. Although the product is freeware, it requires periodic "recharging" every 90 days, which you accomplish by logging onto the SmartCode site and downloading a new "battery." The online help is comprehensive. (Oakley Data Services, Sandback, Cheshire, U.K.; http://www.smartcode.com/freesoft.html.)

UUENCODERS

BY LARRY SELTZER

Uuencoding (Unix-to-Unix encoding) is a method for converting binary data, such as programs or images, into text data that can be transmitted by such text-based systems as e-mail. At the receiving end, the text string is decoded into its original binary format.

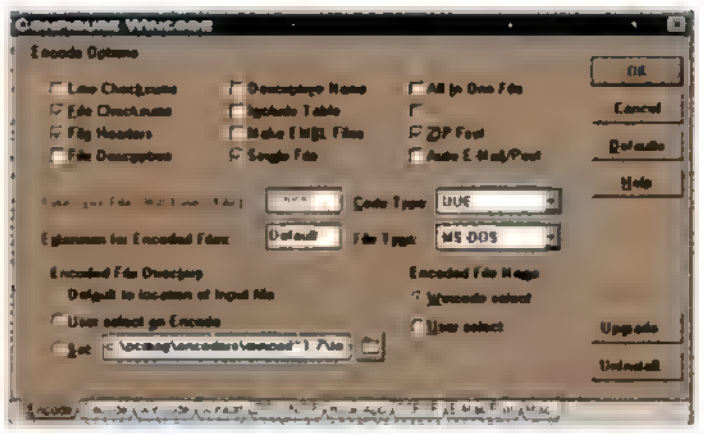
You run into uuencoding a lot on the Internet. It is most commonly used for sending binary data in Usenet messages, and it is the most widely used method for transmitting binary attachments to e-mail messages. If you have ever received an e-mail with garbled text lines, each beginning with an *M*, at the bottom of the message, you probably got a uuencoded attachment that your

First in the alphabet, AAA UUE performs basic tasks well.

software didn't translate or your e-mail program didn't know how to decode.

Uuencoding is so prevalent on the Internet because most of the communication on the Internet is 7-bit (the result of a long legacy of finding least common denominators in the course of its development), and uuencoding is the most common way to transfer 8-bit data—most executable files—over the Net. Uuencoding is a method of translating the 8-bit data from the executable file into the 7-bit character range that character-based programs support.

A number of different uuencoding formats are out there, and the programs reviewed here all support a variety of them. We discovered that there are multiple formats for splitting files as well.



Wincode offers the richest interface and best features of the three uuencoders we tested.

A new standard called MIME (Multipurpose Internet Mail Extensions) is gaining popularity, but ironically, MIME increases the need for uuencode/uudecode utilities. If you use a MIME-only mail system and someone in the outside world sends you a uuencoded attachment, you'll need one of these utilities to put it into a usable format. None of the programs reviewed have official download sites, but they are widely available. At the end of each review, we list a download site valid at press time. Using one of the Web's many search engines, such as Lycos, Webcrawler, or Yahoo, will turn up many more.

AAA UUE 2.0 was obviously named to get in the front of reviews and sorted FTP listings. It's free for download, but the author requests a $5 contribution. It has some nice features, although its interface lacks polish. AAA UUE does the encoding and decoding with small external DOS programs, so you get DOS sessions popping up when you use it. AAA UUE makes it pretty easy to break uuencoded files into smaller components and merge them back together.

AAA UUE also has a facility for calling PKZIP to handle .ZIP files, but there are much better Windows alternatives, in case that's an important feature for you. The program does not accept command line parameters, so it won't work with Windows 95's SendTo feature. The help system supporting AAA UUE is also somewhat meager. But AAA UUE did uuencode and uudecode properly for us, and it's worth the modest sum the author requests. (Scandere Software USA, Dennisport, MA; 508-771-3973; http://www.coast.net/SimTel/win3/encode.html; filename, aaauue20.zip.)

UUCode 3.1.4 is the simplest of the programs tested, but it still offers strong functionality. The registration fee is $10, and an additional $6 gets you the printed manual and the latest version on-disk. Among the programs we tested, only UUCode can both encode and decode MIME. It can join but not split multipart uuencoded files. We couldn't get UUCode to work with some of our test split files, however. There is more than one uuencode format, and one that is supported by UUCode is Wincode. Version 3.1.5, the latest version, just missed our review but it should soon be available on AOL, CompuServe, and Internet forums. (Sabasoft Inc., Naperville, IL; http://www.coast.net/SimTel/win3/encode.html; filename, UUCOD314.ZIP.)

Wincode 2.7 doesn't have every feature you might want in an encoder/decoder, but it has the richest user interface, and it offers the most appealing set of features of the products reviewed here. Though all of the products were tolerably good at encoding and decoding, Wincode encodes to MIME and decodes uuencoded data on the Clipboard as well. It is available for free download, and a help file is available for a $10 registration charge.

The program provides lots of automation capability, and it can hook into other Windows applications. It can send encoded/decoded files via SMTP mail or NNTP to Usenet. Wincode lets you decode a group of split uuencoded files, but you cannot split them at the encode phase. Wincode's facility for calling PKUNZIP after uudecoding also worked well, and Wincode works well with Windows 95's Send To function. You can send it uuencoded files; it will decode them and then quit.

Wincode also has a facility for hooking into the menus of external programs. We found that it worked on 16-bit but not on 32-bit Windows programs, which is not surprising since Wincode itself is written in 16-bit Windows code.

Wincode's author makes his money by selling the help file. Given that some of the program configuration is complicated and that Wincode generally works well, you may want to buy the help file. (Snappy_Inc., Albany, NY; http://snappy.globalone.net.) □

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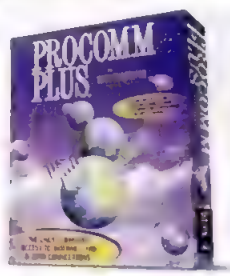

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What Is an Operating System?

How DOS, OS/2, and Windows 95 perform basic OS tasks.

By Jeff Prosise

Microsoft Windows 95 has generated more press than any other operating system to date. It seems as if every time you open a newspaper, there's a mention of Windows 95. It also seems as if every article concludes with an obligatory definition of the term *operating system*. Here's one that appeared in a recent Associated Press report: *Windows 95 is known as an operating system software, which controls a computer's basic functions such as printing or storage of words and data.*

Whenever I read a definition like that, I cringe. While not inaccurate, it fails to paint a meaningful picture of what an operating system is and what it does.

An operating system is like a facilitator, providing an environment for application programs to run in. It typically includes anywhere from tens to thousands of built-in subroutines called *functions*, which applications can call to perform basic tasks such as displaying a string of text on the screen or inputting a character from the keyboard. Could software be written for a computer without an operating system? Yes. But that software would be exceedingly difficult to write. It would have to handle on its own the thousands of details that the operating system normally takes care of. And it would be tailored for a very specific hardware configuration, with no operating system to provide device-independent interfaces to video adapters, disk controllers, and other devices.

The classic definition of an operating system is that it is software that manages four key aspects of a computer's operation:

- processes;
- memory allocation;
- file input and output (I/O);
- device I/O.

To understand what an operating system really is, let's look inside three familiar systems—DOS, Windows 95, and OS/2—and see how they perform these four tasks.

PROCESS MANAGEMENT

First and foremost, an operating system must provide a mechanism for starting *processes*, which most of us know as *programs*. In DOS, that mechanism is a function called EXEC.

When you type a program name on the DOS command line, the program that displays the command line and reads your input—COMMAND.COM—searches for a file whose name matches what you typed and has the extension .COM, .EXE, or .BAT. Assuming it finds the file it's looking for, COMMAND.COM calls the EXEC function and passes it the filename. The EXEC function, in turn, loads the program into memory and begins executing it. Because DOS is a single-tasking operating system (that is, it can run only one program at a time), the program continues running until, either directly or indirectly, it calls another DOS function to terminate itself and return control to COMMAND.COM. Only then does the EXEC function return and the command line reappear so you can start another program.

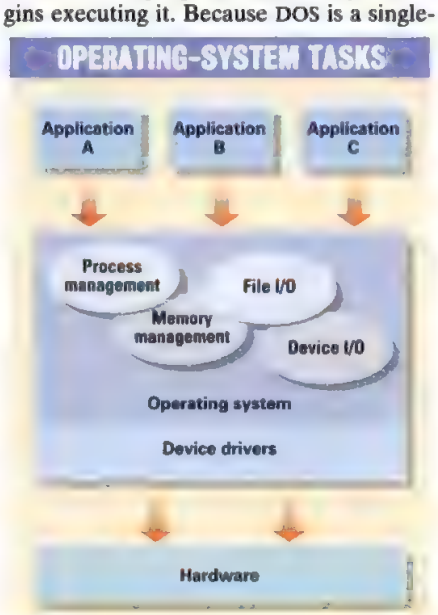

FIGURE 1: *Contrary to popular belief, an operating system doesn't "control" a computer's operation. Rather, it provides the environment in which applications execute.*

Windows 95 and OS/2 also provide functions that start processes. In Windows 95, that function is called CreateProcess. The code for CreateProcess is stored in the operating system kernel (the part of the operating system that's responsible for managing memory, processes, and threads) and comes from a file named KERNEL32.DLL. Like DOS's EXEC function, CreateProcess accepts the name of an executable file. It then loads the file and begins executing it. But unlike EXEC, CreateProcess returns almost immediately after it's called so that more programs can be started. Windows 95 and OS/2 are *multitasking* operating systems, because both permit multiple programs to execute concurrently.

In a single-tasking environment, there is no scheduling of processor time to be performed. The operating system simply relinquishes the CPU when a program starts and reassumes control when the program ends. In a multitasking environment, it's not so simple. The operating system has to divvy out chunks of processor time to active applications and do it efficiently so all the applications appear to be running at once.

The Windows 95 and OS/2 kernels contain *schedulers*, which divide the processor among active applications. Windows and OS/2 processes can contain one or several threads of execution. Every few milliseconds, the scheduler wrests control of the CPU from the thread currently executing, uses a complex time-allocation algorithm to decide which thread should execute next, and begins executing that thread at the point where it was last interrupted. (For more on threads of execution and how they're scheduled, refer to our Tutor column of December 5, 1995.) Thus, the user can type data into a spreadsheet, print a document from a word processor, and download a file from the Internet all at the same time.

MEMORY MANAGEMENT

Another fundamental duty of an operating system is to manage the memory available to it and its applications. DOS does a notoriously poor job of managing memory, because it runs in real mode, where only 1MB of memory is addressable. Of that 1MB, only 640K (minus the amount DOS itself uses) is available to ap-

plications, because 384K is reserved for video RAM, adapter ROMs, and other hardware uses. Windows 95 and OS/2 do a much better job of managing memory, because they can see all of the memory installed in a PC. And when even that much memory isn't enough, both can make more memory available by creating virtual memory from free space on a hard disk. (To learn more about Windows 95's handling of virtual memory, see the Tutor column of March 12, 1996.)

The goal in memory management is to give each application the memory it needs without infringing upon memory used by other applications. When DOS loads and runs a program, it allocates a block of memory to hold the program's code and data. The block belongs to the program and won't be allocated to anyone else until that program gives it up.

If an application requires additional memory, it can call a function in the operating system to request more. If DOS can satisfy the request—that is, if there's at least one unused block of memory that's as large as or larger than the block the program requested—DOS marks the block as "in use" and hands it over. The program can call other DOS functions to resize the memory blocks it owns or free them altogether. If an application ends without deallocating the memory allocated to it, DOS automatically frees up that memory so it can be recycled and parceled out to other applications.

Windows 95 and OS/2 use much more sophisticated memory management schemes that take advantage of the processor's ability to run in protected mode. In this mode, the 1MB limit on addressable memory goes away and *all* memory is usable, including extended memory. Therefore, applications can call memory allocation functions in the operating system and lay claim to vast amounts of memory. If the system can't marshal up enough actual RAM to satisfy an application's request, the virtual memory manager steps in and attempts to make up the difference. This is an oversimplification of the process, but it gives you an accurate picture of what's happening.

Another aspect of memory management under Windows 95 and OS/2 is that both take steps to prevent applications from accessing memory they don't own. In DOS, an application can accidentally (or deliberately) write to someone else's memory—even memory owned by the operating system—and bring the entire system crashing to the ground. Windows 95 and OS/2 protect applications from each other by running them in private address spaces that are logically isolated from one another. They protect operating system code and data by structuring memory in such a way that the CPU notifies the operating system before an illicit access occurs. Neither operating system's protection scheme is perfect, but both do an infinitely better job of preserving system integrity than DOS.

FILE I/O

One of an operating system's most important components is its file system—the part responsible for managing files stored on hard disks and other mass-storage devices. An operating system provides high-level functions that applications can call to create files, open files for reading or writing, transfer data to or from a file, and perform file-management chores such as renaming and deleting.

From an application's standpoint, file I/O is a simple task. To read data from a file, the application first opens the file by calling an operating system function and passing it the filename and optionally a path to the file. It gets back a number known as a *file handle*, which uniquely identifies an open file. To read a chunk of data from the file, the application calls an operating system function (in Windows 95, ReadFile) and passes the operating system the file handle, the address in memory where the file data should be copied, and the number of bytes to copy. When it's finished, the application closes the file by calling another operating system function.

The operating system's role in the process is much more complex. It has to identify each sector on the disk that holds a portion of the requested file and program the drive controller to retrieve the information, sector by sector. And it has to do this efficiently so that information is retrieved quickly. It's like sending a secretary into a room containing thousands of file cabinets and asking for a particular file whose papers may be scattered among hundreds of drawers. In addition to finding and collecting the pieces of paper, the secretary must be able to go directly to the right drawers—in the right order—in a matter of milliseconds.

An operating system can find the right drawers because it stores a map on the disk that contains the name of each file and a record of where it's stored. DOS, Windows 95, and OS/2 each use different methods of allocating disk space and tracking file data, with OS/2's HPFS (High Performance File System) doing by far the best job of the three. DOS's FAT (file allocation table) and Windows 95's VFAT (virtual file allocation table) file systems do an adequate job on floppy disks and small to medium-size hard disks, but they can be terribly inefficient on large hard disks. (For details, see the Tutor column of October 10, 1995.)

DEVICE I/O

The fourth and final area in which operating systems play a huge role in making computers work is device I/O. A device is a piece of hardware such as a video adapter, keyboard, or mouse. To talk to a device, a program must speak the device's language, which usually consists of arcane streams of 1s and 0s. There are thousands of different devices out there and thousands of different "languages," so the operating system lends a hand by serving as an interpreter.

Like most operating systems, Windows 95 and OS/2 use special programs called *device drivers* to translate input and output requests into commands to specific hardware devices. To draw a line on the screen, for example, a Windows 95 application calls a function in the operating system's GDI (Graphics Device Interface) named LineTo. The GDI, in turn, passes the request to the display driver, and the display driver scan-converts the line into 1s and 0s representing pixel colors and pokes the color values into the video buffer. How the pixel colors are poked into the video buffer varies with different adapters, but the application doesn't worry about that, because the display driver sweats the details.

Windows 95 comes with dozens of display drivers, so applications can work with a wide range of display adapters despite differing hardware architectures. Drivers are also provided for keyboards, mice, serial ports, printers, disk controllers, CD-ROM drives, and other devices, and drivers for more exotic add-ons are available from third parties.

DOS also uses device drivers, but its screen, keyboard, and printer drivers are so primitive that most DOS applications perform device I/O by relying on low-level routines encoded in ROM in the computer's BIOS (Basic Input/Output System) or by talking directly to the hardware. Sometimes developers write their own device drivers: Remember all the WordPerfect printer drivers?

FURTHER READING

If you'd like to learn more about operating systems and get some keen insights into the architecture of Windows and OS/2, the following books are a place to start:

- *The Design of OS/2*, by Harvey M. Deitel and Michael S. Kogan. Addison-Wesley, 1992.
- *Inside Windows NT*, by Helen Custer. Microsoft Press, 1993.
- *Inside Windows 95*, by Adrian King. Microsoft Press, 1994.
- *Operating Systems: Design and Implementation*, by Andrew S. Tanenbaum. Prentice-Hall, 1987.

If you want to know the specifics of Windows 95's management of processes, threads, memory, and other resources, check out Matt Pietrek's book *Windows 95 System Programming Secrets* (IDG Books, 1995). Pietrek disassembles the operating systems he writes about one machine instruction at a time and actually makes reading about selectors, process handles, and other operating system esoterica fun. The only way you'll learn more about Windows 95 is to get a copy of the source code. □

Jeff Prosise is a contributing editor of PC Magazine.

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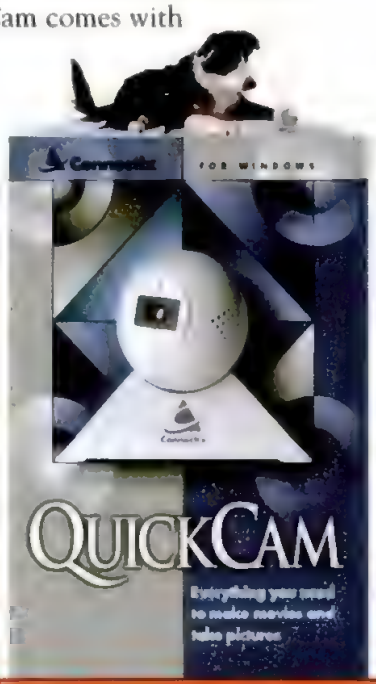

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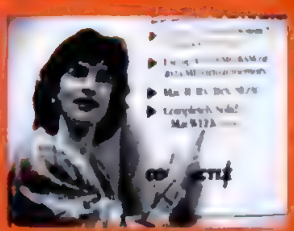
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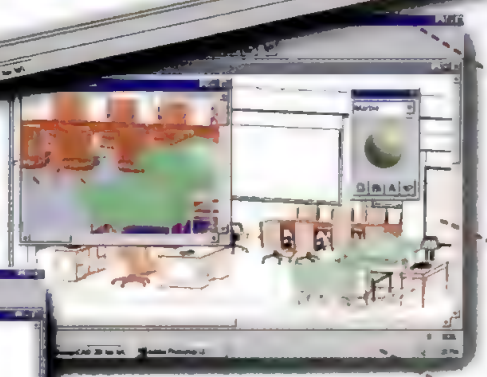

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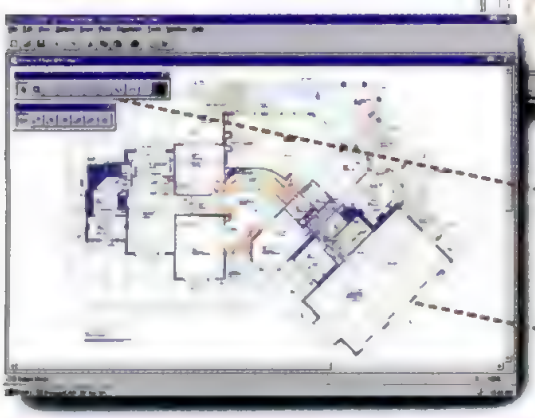

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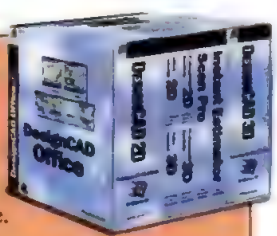

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By Jeff Prosise

Build Reusable MFC Control Classes

Message reflection lets controls process their own notifications.

One of the challenges that confronted the Microsoft Foundation Classes' architects when they set out to design a C++ class library for Windows programming was devising a means by which operating system objects wrapped in MFC classes, like windows, could control their own destinies. For example, when you add a modeless dialog box to an application written in C++, you have to modify the top-level window's message loop so that ::IsDialogMessage is called before ::TranslateMessage and ::DispatchMessage.

Having to modify one class to make another one work violates the object-oriented programming principle of self-containment and inhibits reusability, so MFC dialogs include virtual PreTranslateMessage functions that can be overridden to add dialog-specific behavior to the message loop. Other virtual functions such as CWnd::PreCreateWindow complement CWnd::PreTranslateMessage and make windows seem much more objectlike.

One element of MFC's object architecture that is sometimes overlooked by MFC programmers is a virtual function named CWnd::OnChildNotify. OnChildNotify lets classes derived from CEdit, CListBox, and other MFC control classes process their own notification messages. Suppose you want to create a list box that pops up a dialog box when an item is double-clicked so that the item can be edited. The list box's parent receives the double-click notification, so in C++, the parent also has to display the dialog box and stuff the edited item back into the list box. That won't do in an OOP environment, because if the list box class is to be reusable, it must be able to display the dialog on its own.

That's the kind of problem that CWnd::OnChildNotify was designed to solve. When a window doesn't handle a notification sent to it by a child window, the MFC application framework "reflects" the notification back to the window that sent it by calling that window's OnChildNotify function. By overriding OnChildNotify in a derived list box class, you can create a list box that responds to its own double-click notifications; that implements its own behavior independently of its parent. That's what self-containment and reusability are all about.

MFC 4.0 supersedes OnChildNotify with a more generalized mechanism for reflecting unhandled notifications from parent windows back to their children. Rather than override OnChildNotify and use a *switch* statement to trap selected notifications, you can now place entries for the messages you'd like reflected in the child window's message map and provide handlers for specific notification types. With message reflection, it's a simple matter to write a list box class that responds to its own double-click notifications or a static control class that sets its own text color by processing the WM_ CTLCOLOR messages sent to its parent. Let's see how message reflection works and how you can use it to build reusable control classes of your own.

MESSAGE REFLECTION MACROS

Macro	Description
ON_CONTROL_REFLECT	Reflects WM_COMMAND messages.
ON_NOTIFY_REFLECT	Reflects WM_NOTIFY messages.
ON_WM_CTLCOLOR_REFLECT	Reflects WM_CTLCOLOR messages.
ON_WM_DRAWITEM_REFLECT	Reflects WM_DRAWITEM messages sent by owner-drawn controls.
ON_WM_MEASUREITEM_REFLECT	Reflects WM_MEASUREITEM messages sent by owner-drawn controls.
ON_WM_COMPAREITEM_REFLECT	Reflects WM_COMPAREITEM messages sent by owner-drawn controls.
ON_WM_DELETEITEM_REFLECT	Reflects WM_DELETEITEM messages sent by owner-drawn controls.
ON_WM_CHARTOITEM_REFLECT	Reflects WM_CHARTOITEM messages sent by list boxes.
ON_WM_VKEYTOITEM_REFLECT	Reflects WM_VKEYTOITEM messages sent by list boxes.
ON_WM_HSCROLL_REFLECT	Reflects WM_HSCROLL messages sent by horizontal scroll bars.
ON_WM_VSCROLL_REFLECT	Reflects WM_VSCROLL messages sent by vertical scroll bars.
ON_WM_PARENTNOTIFY_REFLECT	Reflects WM_PARENTNOTIFY messages.
ON_UPDATE_COMMAND_UI_REFLECT	Reflects update commands to toolbars, status bars, and other UI objects.

FIGURE 1: *These are the message-map macros used in message reflection.*

THE BASICS OF MESSAGE REFLECTION

Modifying a derived control class to take advantage of message reflection is a two-step process. First, add entries for the messages you wish to reflect to the class's message map. Second, add member functions to handle the reflected messages

Figure 1 lists the message-map macros used in message reflection. The first two—ON_CONTROL_REFLECT and ON_NOTIFY_REFLECT—are the most generic of the group. They reflect child-window notifications sent in the form of WM_COMMAND and WM_NOTIFY messages. To enable a list box to handle its own double-click notifications, you could add the following message-map macro and handling function to a class derived from CListBox:

```
// In the message map
ON_CONTROL_REFLECT
(LBN_DBLCLK, OnDoubleClick)

void CMyListBox::OnDouble-
Click ()
 {
// Do something with the
// double click
 }
```

Any notification that is passed through a WM_COMMAND message can be reflected in this way. ON_NOTIFY_REFLECT does the same thing for notifications passed in WM_NOTIFY messages. The following code reflects NM_OUTOFMEMORY notifications from a Windows 95 common control to a handler in the derived control class:

```
// In the message map
ON_NOTIFY_REFLECT (NM_OUTOFMEMORY,
OnNoMemory)
void MyControlClass::OnNoMemory
(NMHDR* pNotifyStruct,
    LRESULT* plResult)
{
  // Handle the out-of-memory error
}
```

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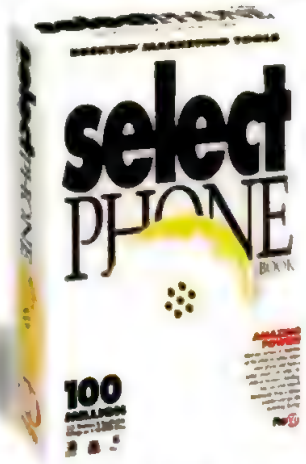

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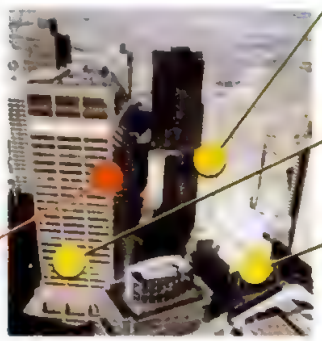
The Select Phone way to canvas the neighborhood. Brenda Jackunas is a franchise owner of Windsor Chem-Dry, an Oriental and area rug cleaning shop. Brenda likes to build her business using customer referrals. First she looks up a current customer in Select Phone. Tags it. Then she hits the little red door "Neighbor" button. Within seconds, Select Phone generates a prospect list of her customer's neighbors, the people living on the same street. (She can also use this feature to create a list of all companies within the same office building!) Armed with this list, Brenda gets the customer's permission to have their neighbors drop by and see her company's work. Talk about micro marketing! Who better to sell for you than your own customers. But does it really work? In Brenda's words, "Very successfully!"



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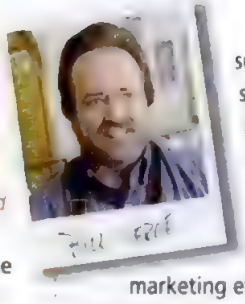

Select Phone comes with [illegible] tea downloading and [illegible] use. Bill Vergé designs, creates and sells the gold and platinum jewelry you'll find in his Scituate store. Like many successful small business owners, Bill must rely on his own marketing efforts to build his business. It's all up to him. So when he's not at his work-bench, Bill's at his computer. After 17 years as a retailer, Bill knows he needs to do at least four mailings a year – 10,000 pieces at a time – to generate decent store traffic. No small investment for any business. After years of renting expensive lists he could only use once, Bill discovered Select Phone. Now he creates his own instant, ready-to-mail lists, saving him the cost, time and aggravation of renting them from a broker. And better yet, Bill is now free to use any or all of Select Phone's 100 million listings as often as he wants.

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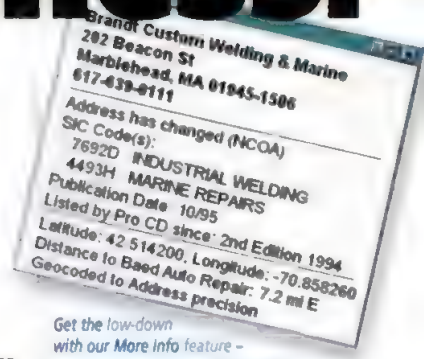

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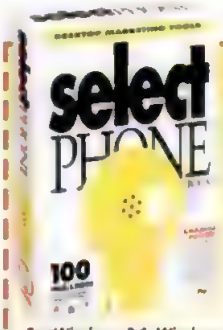

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WM_CTLCOLOR MESSAGE TYPES

Message	Control/window type
WM_CTLCOLORBTN	Push buttons (processing this message has no effect in Windows 95).
WM_CTLCOLORDLG	Dialog boxes
WM_CTLCOLOREDIT	Edit controls and the edit control components of combo boxes.
WM_CTLCOLORLISTBOX	List boxes and the list box components of combo boxes
WM_CTLCOLORMSGBOX	Message boxes.
WM_CTLCOLORSCROLLBAR	Scroll bars.
WM_CTLCOLORSTATIC	Static controls, check boxes, radio buttons, group boxes, read-only edit controls, and other controls that use the system color COLOR_3DFACE.

FIGURE 2: *WM_CTLCOLOR is subdivided into seven different message types in Windows 95.*

When OnNoMemory is called, pNotifyStruct points to the NMHDR structure that accompanies the WM_NOTIFY message and plResult points to the variable that receives the function's return value.

ON_WM_CTLCOLOR_REFLECT reflects WM_CTLCOLOR messages sent to a control's parent so that the control can set its own colors. WM_CTLCOLOR is subdivided into seven different message types in Windows 95 (Figure 2). But that doesn't matter, because ON_WM_CTLCOLOR_REFLECT reflects them all. The handler for a reflected control-color message can use CDC::SetTextColor and CDC::SetBkColor to set the control's foreground and background colors. (The exact effect of these functions varies with the control type.) It also returns an HBRUSH value that's used to paint the portion of the control's background that is not affected by SetBkColor.

Here's what the ON_WM_CTLCOLOR_REFLECT message-map entry and handling function might look like for a custom static control class derived from CStatic:

```
// In the message map
ON_WM_CTLCOLOR_REFLECT ()
HBRUSH CMyStatic::CtlColor (CDC*
pDC, UINT nCtlColor)
{
    pDC->SetTextColor (RGB (255, 0,
    0));
    pDC->SetBkColor (RGB (255, 255,
    255));
    return (HBRUSH) m_brBkgnd;
}
```

Assuming m_brBkgnd is a Cbrush that paints solid blue, the control's text will be drawn in red, the gaps in and between characters will be colored white, and the background—everything inside the control's borders not covered by text—will be blue. nCtlColor identifies the type of WM_CTLCOLOR message that prompted the call.

The macros ON_WM_DRAWITEM_REFLECT, ON_WM_MEASUREITEM_REFLECT, ON_WM_COMPAREITEM_REFLECT, and ON_WM_DELETEITEM_REFLECT are used to create owner-drawn controls that paint themselves in response to owner-draw messages rather than relying on their parents to do the painting. You can use these macros (and their handlers) in lieu of the virtual DrawItem, MeasureItem, CompareItem, and DeleteItem functions supported by selected MFC control classes. If you use these reflection macros in a derived control class and find that the handling functions are not being called, check that the control is being created with an owner-drawn style flag. One way to make sure the style is set properly is to override the base class's PreCreateWindow function and toggle individual style bits on and off yourself.

The ON_WM_CHARTOITEM_REFLECT and ON_WM_VKEYTOITEM_REFLECT macros apply to list boxes only. The former reflects WM_CHARTOITEM messages that an LBS_WANTKEYBOARDINPUT–style list box sends to its parent in response to WM_CHAR messages. The latter reflects WM_VKEYTOITEM messages that an LBS_WANTKEYBOARDINPUT–style list box sends to its parent in response to WM_KEYDOWN messages. Both are useful for customizing how list box classes respond to keyboard input.

To create self-contained scroll bar controls that respond to their own WM_HSCROLL and WM_VSCROLL messages, you can derive a class from CScrollBar and place an ON_WM_HSCROLL_REFLECT or ON_WM_VSCROLL_REFLECT entry in the message map. One application for reflected scroll bar messages is to create a scroll bar control that can be attached to a window or rectangle (similar to the way an up-down control is attached to a "buddy" window) and assigned a bitmap image. Clicking the scroll bar would scroll the bitmap, and the scroll bar would handle the scrolling without any help from its parent. Anyone who has written code to scroll a bitmap knows that there are some tricks to optimizing performance. It's only a matter of time until someone uses message reflection to write a smart scroll bar control that scrolls bitmaps optimally and prevents the rest of us from having to reinvent the wheel over and over.

ON_WM_PARENTNOTIFY_REFLECT reflects WM_PARENTNOTIFY messages to the control that sent them. WM_PARENTNOTIFY messages are sent to a control's parent when the control is created and destroyed and when a mouse button is clicked inside the control. An ON_WM_PARENTNOTIFY_REFLECT handler receives a UINT parameter that identifies the event that prompted the message, as well as an LPARAM that contains the child's window handle if the event code is WM_CREATE or WM_DESTROY, or contains the cursor coordinates if the event code is WM_LBUTTONDOWN, WM_MBUTTONDOWN, or WM_RBUTTONDOWN. Note

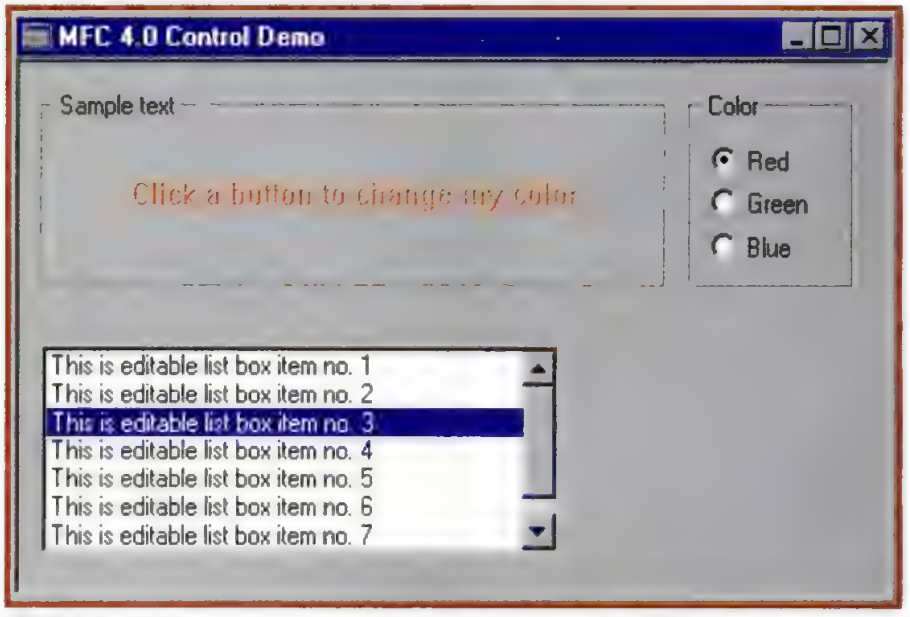
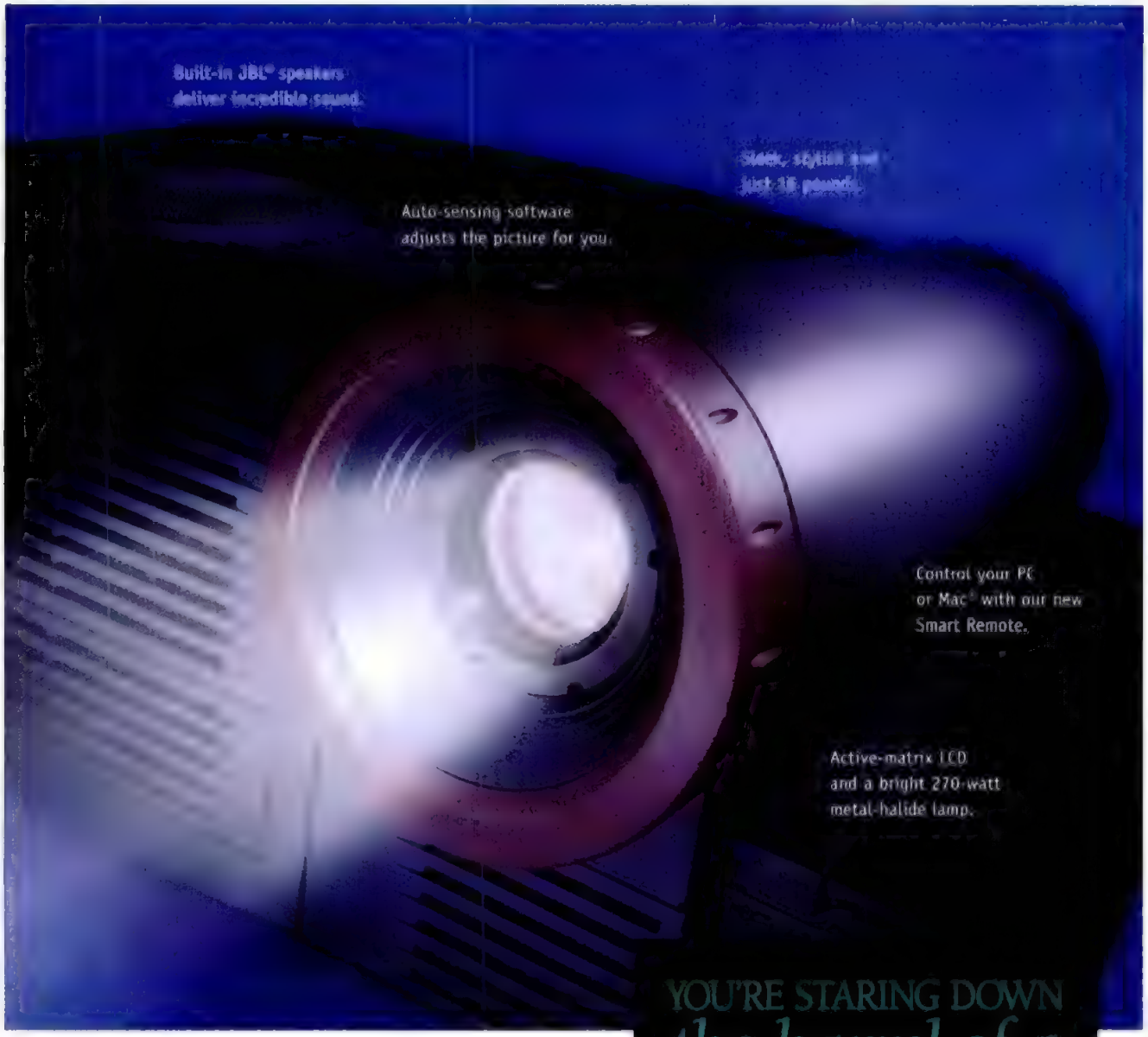


FIGURE 3: *The CtlDemo sample program displays one instance of the CColorStatic class and one instance of CEditListBox.*



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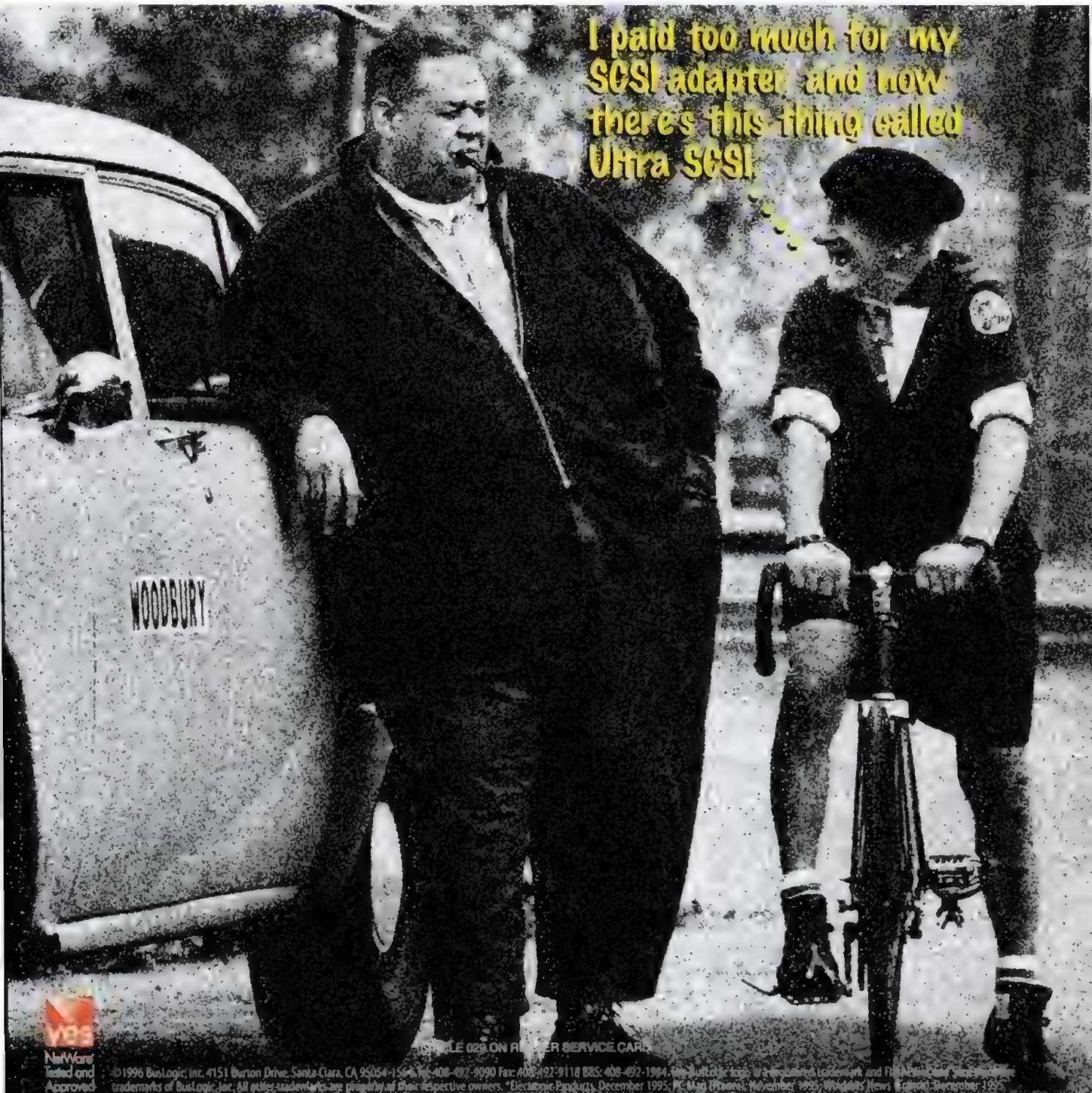

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that controls created with the extended window style WS_EX_NOPARENTNOTIFY (the default for controls created in a dialog box) do not send WM_PARENTNOTIFY messages to their parents.

The ON_UPDATE_COMMAND_UI_REFLECT macro reflects user interface (UI) update commands generated by the framework. One application for this macro is a toolbar class that handles UI updates for its buttons. Suppose you derive a class from CToolBar and use it to create a toolbar with bold, italic, and underline buttons that are designed to work with a CRichEditView. Normally, you'd probably put the UI update handlers for the buttons in the view class. But with ON_UPDATE_COMMAND_UI_REFLECT to help out, you could just as easily reflect the update commands to the toolbar and allow the toolbar to do the button updating.

MESSAGE REFLECTION AT WORK

The sample program, whose output is shown in Figure 3, uses two derived control classes that rely on message reflection to process their own notifications. The first control class encapsulates static text controls whose foreground and background colors can be set with a pair of member functions named SetTextColor and SetBkColor. The second creates list box controls whose items can be edited in place, using a miniature edit control that pops up when an item is double-clicked. Both are handy classes to have in your toolbox, and both are easily ported to other applications because they are entirely self-contained. The source code for the sample program, which I've named CtlDemo, is available for downloading from PC Magazine Online. See the sidebar "Guide to Our Utilities" in the Utilities column for downloading instructions.

Take CtlDemo for a test drive by starting it up and clicking on the radio buttons in the Color box. The static text control to the left of the buttons will change to the color you selected. In a conventional Windows application, the color change would require the cooperation of the static text control's parent. In CtlDemo, however, the control changes its own color because it's created from the custom CColorStatic class. When a radio button is clicked, the frame window receives a button-click notification. It responds by calling the CColorStatic control's SetTextColor member function to set the text color to red, green, or blue.

For a behind-the-scenes glimpse at how CColorStatic works, see the class derivation in CtlDemo.h and the class implementation in CtlDemo.cpp. The colors used to paint the control are stored in three CColorStatic data members: m_crTextColor, which contains the text foreground color; m_crBkColor, which contains the text background color; and m_brBkgnd, which is a brush used to paint the area of the control rectangle surrounding the text string.

These data members are initialized by the class constructor so that the default color is black on gray. (Actually, the system color, COLOR_3DFACE, defaults to light gray.) CColorStatic::SetTextColor changes the value of m_crTextColor, and CColorStatic::SetBkColor changes both m_crBkColor and m_brBkgnd. An ON_WM_CTLCOLOR_REFLECT entry in the class's message map reflects control-color messages back to the control, and CColorText::CtlColor sets the foreground and background colors to the values in m_crTextColor and m_crBkColor and returns the brush handle associated with m_brBkgnd.

For another demonstration of message reflection at work, double-click one of the items in CtlDemo's list box. An edit control will pop up over the top of the item, as shown in Figure 4. Edit the text of the item and press Enter to accept the changes or Esc to cancel them. You can also cancel your changes by clicking another item in the list box or shifting the input focus to another control.

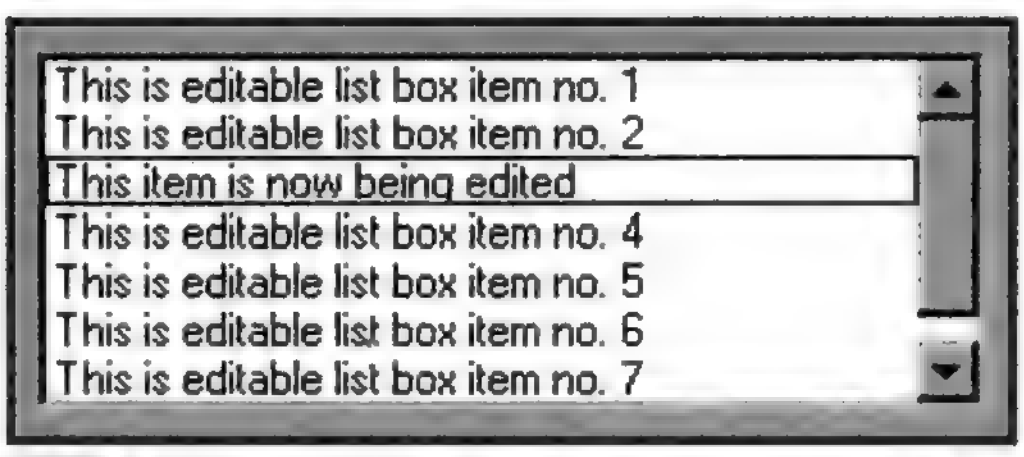


FIGURE 4: *CtlDemo's CEditListBox class allows list box items to be edited in place.*

The list box is created from a custom control class, CEditListBox, that is derived from CListBox. CEditListBox's message map includes an ON_CONTROL_ REFLECT entry that reflects LBN_DBLCLK notifications to the list box. (To make sure the notifications are sent, the list box's PreCreateWindow function adds an LBS_NOTIFY flag to the list box style.) When an item is double-clicked, CEditListBox::OnEditItem retrieves the text of the item, creates an edit control that exactly fits the item rectangle, sets the edit control's font to the font used in the list box, and sets the focus to the edit control.

The edit control itself isn't a standard CEdit, but rather a CLBEdit that notifies its owner—the list box—when Enter or Esc is pressed or when the focus shifts to another control. When Enter is pressed, the edit control transmits its text to the list box by calling the public CEditListBox member function UpdateItemText, then destroys itself. When Esc is pressed or the input focus is lost, the edit control destroys itself without calling UpdateItemText. The result is a tidy little package that makes it simple to add an edit-in-place list box to any MFC application.

> CEditListBox is a tidy little package that makes it simple to add an edit-in-place list box to any MFC application.

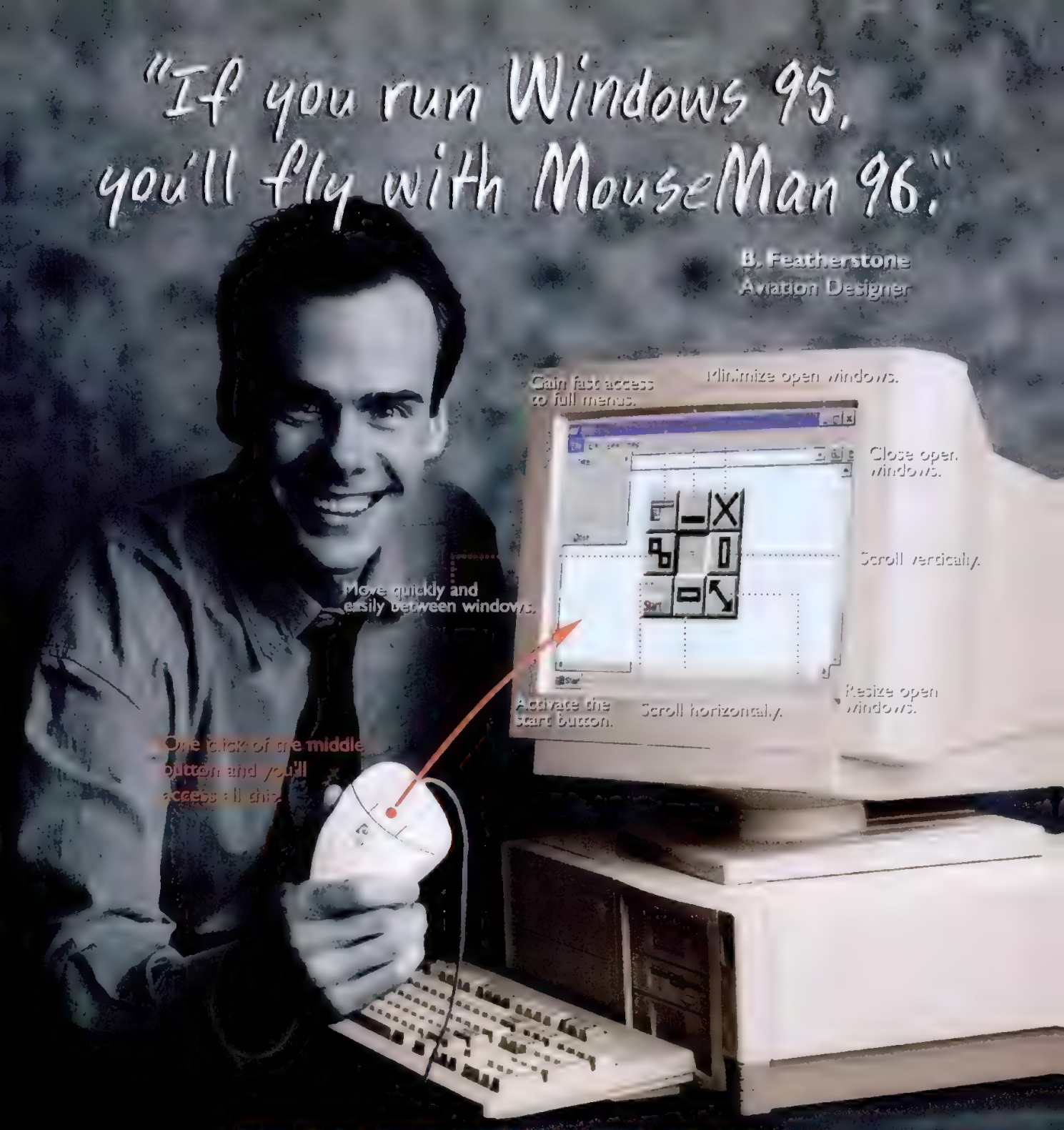
The list box that CEditListBox creates is an owner-drawn list box because CListBox::GetItemRect, which is used to position the edit control over the list box item, doesn't work with conventional list boxes. CEditListBox::PreCreateWindow makes sure the list box style includes an LBS_OWNERDRAWFIXED flag. It also adds the style LBS_HASSTRINGS so Windows will handle the list box strings. Another advantage of using LBS_HASSTRINGS is that it prevents the list box from having to handle WM_MEASUREITEM, WM_COMPAREITEM, or WM_DELETEITEM messages even though it's an owner-drawn list box.

CEditListBox handles its own WM_DRAWITEM messages by overriding the virtual DrawItem function that it inherits from CListBox. Because LBS_HASSTRING–style list boxes do not send WM_MEASUREITEM messages to their parents, CEditListBox includes an OnSetFont handler that sets the item height manually whenever the list box receives a WM_SETFONT message.

QUESTIONS AND ANSWERS

If you have comments on this column, questions about Windows or MFC programming, or suggestions for programming issues that you would like to see addressed in this column, contact me in the Power Programming section of PC MagNet's Utilities/Tips forum on CompuServe. My CompuServe ID is 72241,44. From the Internet, address your e-mail to *72241.44@compuserve.com*. Please note that I can not answer all questions individually. □

Jeff Prosise is a contributing editor of PC Magazine *and author of the upcoming* Programming Windows 95 with MFC, *due out from Microsoft Press this spring.*



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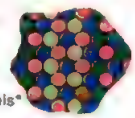

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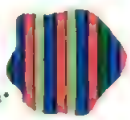

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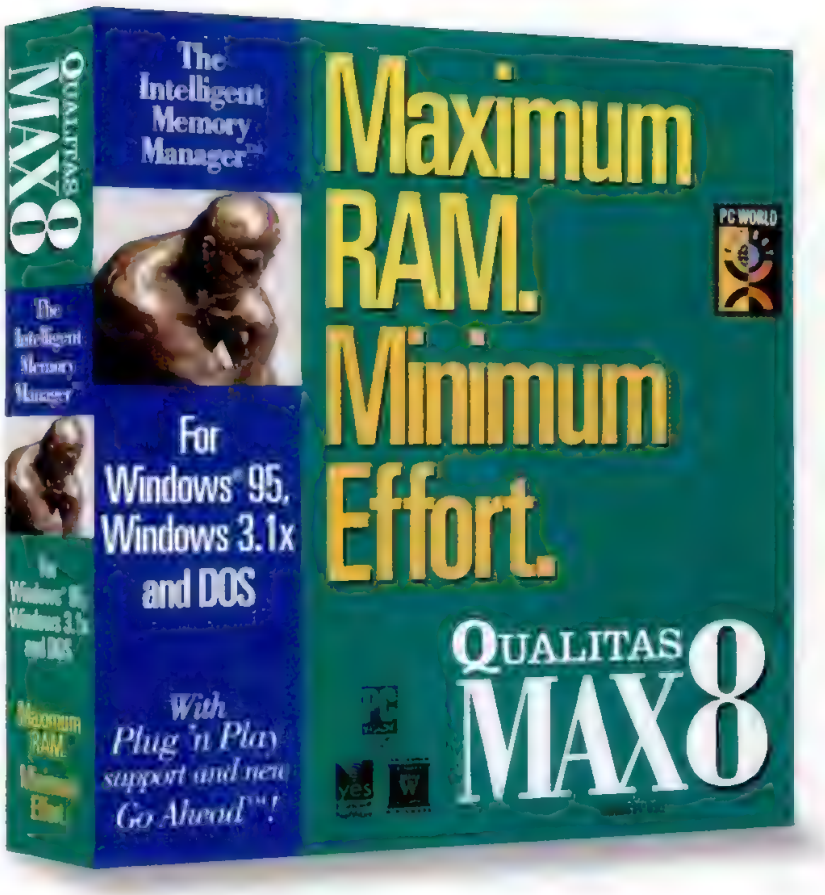

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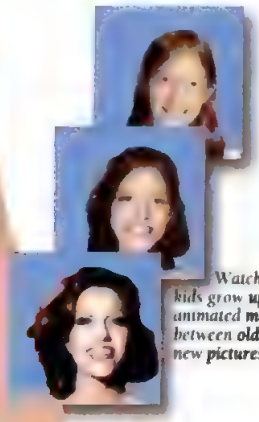

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$1599
[illegible]	486SX-75	8MB	420	10.4 [illegible]	$1799
[illegible]	486SX4-100	8MB	720	10.4 D/S Color	$1799
[illegible]	486DX4-75	8MB	720	10.4 Active Color	$2299
[illegible]	Pentium 75	8MB	540	10.4 [illegible]	$3199
[illegible]	Pentium 75	8MB	810	11.3 D/S Color	$3799
[illegible]	Pentium 75	8MB	810	10.4 Active Color	$4249
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MODEL #	PROCESSOR	RAM	HD	DISPLAY	PRICE
[illegible]	PENTIUM [illegible]	4MB	[illegible]	[illegible]	$2899
[illegible]	PENTIUM [illegible]	4MB	540	10.4 D/S Color	$2599
[illegible]	PENTIUM [illegible]	4MB	540	10.4 Act Color	$3099
[illegible]	PENTIUM [illegible]	8MB	720	10.4 Act Color	$3899
[illegible]	PENTIUM [illegible]	8MB	810	10.4 Act Color	$4099
[illegible]	PENTIUM MMX 120	8MB	1.0G	11.3 Act Color	$4499
[illegible]	486DX4-75	4MB	340	9.5 D/S Color	$1249
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MODEL #	PROCESSOR	RAM	HD	DISPLAY	PRICE
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$2399
[illegible]	486DX4-100	8MB	810	10.4 D/S Color	$2499
[illegible]	PENTIUM MMX 90	8MB	810	11.3 Act Color	$4599
[illegible]	PENTIUM MMX 120	8MB	1.2G	11.3 Act Color	$5499
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[illegible] 700	486DX4-100	8MB	810	10.4 Active Color	$1899
[illegible] 800	Pentium 75	8MB	520	10.4 Dual Scan	$1899
[illegible] 800	Pentium 75	8MB	810	10.4 Active Color	$2399
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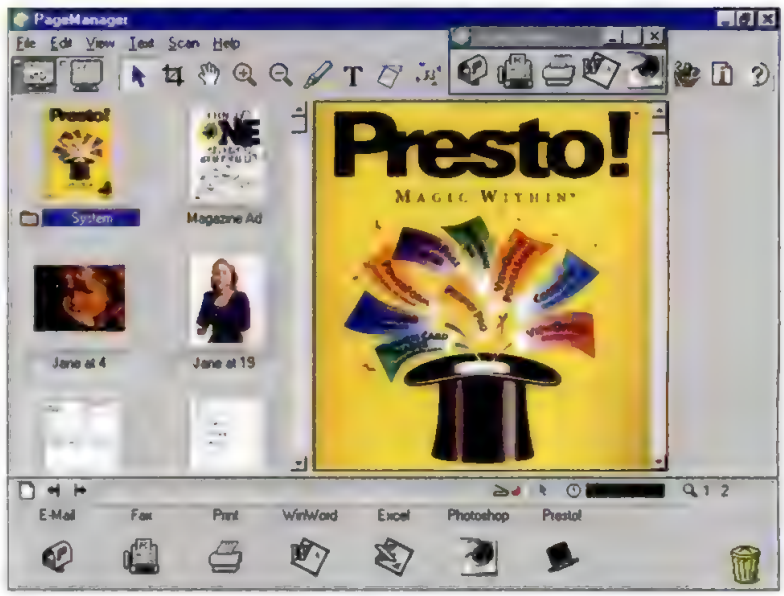

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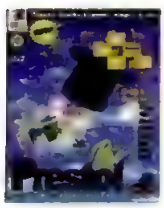
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CIRCLE 078 ON READER SERVICE CARD

By Esther Schindler

Understanding the OS/2 CONFIG.SYS File

The first step toward optimizing your OS/2 system.

Our first exploration into the role of OS/2's CONFIG.SYS file (March 12, 1996) showed how the file is processed and explained how some of the statements work. In this column, we'll continue to examine this powerful file, giving special attention to controlling how OS/2 runs DOS and Windows applications and to improving system performance.

CONFIG.SYS is an ASCII text file located in the root directory of your OS/2 boot drive. OS/2 constructs your CONFIG.SYS file based on the equipment in your system when you install the operating system. That is, for each device it recognizes, the installation program creates a line in your CONFIG.SYS file to load the proper driver. Similarly, the installation program creates a line in CONFIG.SYS to load the proper video driver for the card it recognizes. Other statements are established based on system parameters during installation; the values that control the size of the swap file, for example, are determined by the amount of RAM available when you installed OS/2. In most cases, the base CONFIG.SYS created during installation is perfectly adequate—so why pull it apart and delve into its workings?

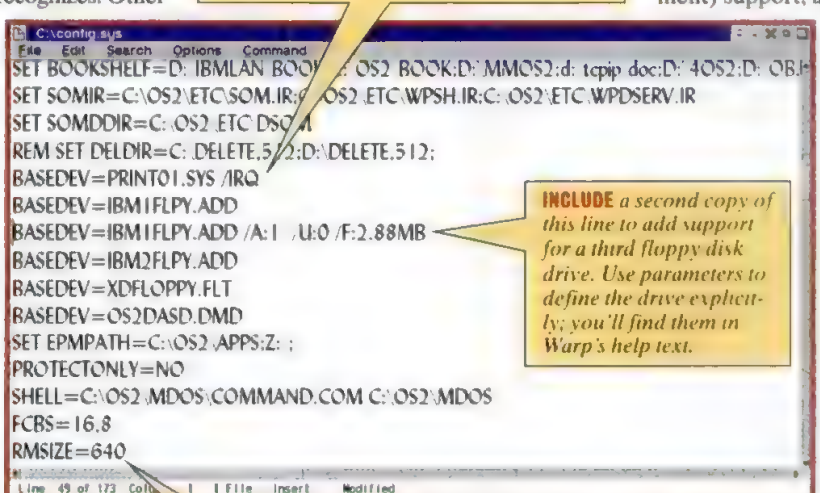
Alas, it's not a perfect world. Every so often, the OS/2 installation program will make a wrong guess, especially when it encounters unusual hardware. In fact, if you encounter problems installing OS/2 Warp, the second-most-likely culprit is a wrong setting in CONFIG.SYS. (The number one culprit is hardware conflicts.) As a result, you might occasionally need to modify lines to add some parameters or to ensure that the operating system will use the correct driver.

It's also the case that while many CONFIG.SYS statements are almost never modified—so that you begin to wonder why IBM didn't simply hard-code the information somewhere—your OS/2 system will almost certainly evolve over time, and new lines or new values may need to be added. Finally, only through knowledgeable tweaking and careful experimentation with your configuration can you expect to wring maximum performance out of your system.

CONTROLLING DOS SESSIONS

Most OS/2 users still have some DOS and Windows programs, so let's start by looking at ways to make them work more effectively.

To understand how CONFIG.SYS affects DOS applications, you need to know how OS/2 manages memory for DOS and Windows programs. In OS/2, every DOS application runs in its own session, as if it's alone in its own DOS computer—that's why DOS sessions are referred to as *virtual DOS machines* (VDMs). And as far as OS/2 is concerned, Windows is just another DOS application with demanding video requirements; Windows applications run in VDMs like any DOS application. Although the DOS application believes it's the only program running, OS/2 is behind the scenes, managing memory and disk access and handling resources—such as mouse control—that a DOS device driver or a TSR would normally manage.



OS/2 loads virtual drivers for many of the functions that DOS or a DOS device driver normally supplies. (For instance, OS/2 loads VMOUSE.SYS instead of DOS's larger MOUSE.COM, and when a DOS application calls for mouse support, OS/2 supplies it through the virtual driver.) These virtual drivers consume less RAM than the original DOS drivers, so DOS applications under OS/2 often have more RAM available than they do under "vanilla" DOS.

The drivers loaded in CONFIG.SYS that control DOS virtual memory and other DOS resources start with a V. For instance, COM.SYS is the OS/2 serial communications driver; VCOM.SYS manages the virtual serial ports for DOS. Similarly, VEMM.SYS provides virtual EMM (expanded memory management) support, and VCDROM.SYS provides virtual support for CD-ROM drives. Some OS/2 applications will load their own virtual drivers, such as VTCPIP.SYS, which the Internet Access Kit adds. Ordinarily you won't need to change the virtual driver statements unless you want to use a replacement for one or another of the drivers; in that case, you'd supply the replacement filename in CONFIG.SYS.

The DOS command processor is defined with the SHELL statement; as in DOS, you can replace the default shell. The shell statement works as it does in DOS, so you can also change the environment size. Other lines, such as the FILES statement, are similar to those you'd find in any DOS CONFIG.SYS file; they set the default values that DOS sessions will use.

Note, though, that these statements establish the *default* settings for a DOS session. Any DOS device drivers you include in CONFIG.SYS will be loaded into *all* DOS sessions, reducing the amount of conventional memory available. The defaults work fine most of the time, and if you use a lot of DOS and Windows applications, leave those settings at their default values. Instead, you can improve your system's

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Tools of the Trade

Here are a couple of tools that can help you understand and optimize your CONFIG.SYS file.

Clear & Simple's Performance PLUS V3 is a $39.95 utility that includes an Optimizer feature for examining system settings. With a single mouse click it will apply its recommended settings to change your CONFIG.SYS. Performance Plus also includes a useful book about improving system performance and provides tools that let you tinker with each setting to fine-tune your system. 203-658-1204; fax, 203-651-0354.

A freeware program called CFGInfo helps you evaluate your CONFIG.SYS and provides a lot of useful information (with even more obscure CONFIG.SYS statements you can add). If you can't find CFGINFO.ZIP on your local BBS, contact the author at *rick.meigs@nwcs.org*.

performance and reliability by modifying the program objects for the specific DOS or Windows applications. This seems to have a larger impact on Windows applications than on DOS applications, but the results depend on the mix of programs you use.

Novice OS/2 users often continue to run Windows applications from the Windows Program Manager, missing out on one of the benefits of OS/2. Since every DOS session runs in its own VDM, if you create a separate program object for each Windows application, you can modify each application's settings to run with the most efficient memory management. Use the program object's setting notebook to modify the DOS or WinOS2 settings. Turn off XMS if an application doesn't use it; give another application access to (virtual) UMBs (upper memory blocks). If one of your DOS or Windows applications requires a specific driver, use the DOS_DEVICE setting in the application's settings notebook to add it to the program object for that application alone, instead of loading it in CONFIG.SYS.

Windows communications programs, for example, sometimes run slowly in OS/2 using the default values. If you encounter this problem, you can improve performance with a mixture of CONFIG.SYS modifications and program object settings. Use the settings notebook to change the WinOS2 memory settings (for example, set EMS_MEMORY_LIMIT to 0 and use XMS or DPMI instead). In CONFIG.SYS, remove the /UMB from the device line for VXMS.SYS; this can resolve memory leakage and conflicts in Windows. Setting DOS=LOW,NOUMB in CONFIG.SYS can help, or you can modify the DOS HIGH and UMB settings in the program object's settings notebook.

An individual program object's DOS settings can affect performance in other ways. For instance, you wouldn't want OS/2 to decide inappropriately that your Windows or DOS communications program was idle and to reduce its priority. For best performance, therefore, you should set its Idle Sensitivity to 100 and Idle Seconds to the maximum value of 60. This effectively keeps OS/2 from deciding that the program is idle.

You can also tell a given program object to use a batch file other than the default AUTOEXEC.BAT as its startup file. If only one of your DOS programs requires a particular TSR, only that application needs to load it, not every DOS application on your system. Remember that the DOS settings in your CONFIG.SYS file are the defaults established for a basic DOS session. You can and should modify settings for individual program objects for your DOS and Windows applications and, in general, leave the DOS-related lines in CONFIG.SYS at the default values OS/2 supplied.

CACHE AS CACHE CAN

Computer users spend a lot of time opening, modifying, and closing files. Hard disks and other storage media are among the slowest system components, so anything that can speed up access to files (including the operating system's own files) can make a dramatic difference in system performance. OS/2 includes several CONFIG.SYS commands for controlling how the operating system should handle file input and output (reading from and writing to your hard disk). By modifying a few lines, you can speed up your computer significantly.

Chunks of memory called *buffers*, measured in 512-byte increments, hold information temporarily when OS/2 is interacting with hard disks and other input/output (I/O) devices. Buffers provide a transient place for the I/O device driver to store data until the processor is ready to pick it up, allowing the input device and OS/2 to work simultaneously. The BUFFERS statement in CONFIG.SYS establishes the number of 512-byte disk buffers that OS/2 keeps in memory.

Increase the value of BUFFERS if you run many programs concurrently. If you do a lot of multitasking, the buffers can fill up before the processor gets around to picking up the data and your system won't run at optimum speed. But keep in mind that for each buffer you add, you reduce your available RAM by 512 bytes. That RAM might be better used for a particular application. Only experimentation will determine what works best for you.

Disk caching, which uses part of the system's memory as an additional hard disk buffer, can also help improve system performance. Caching extends the lifetime of the data in memory, based on what's used and how often it's accessed. Disk caching keeps the most frequently accessed information in RAM, so the processor doesn't have to wait on slow I/O devices.

Caches are managed separately for FAT and HPFS drives. If you use FAT, the cache settings are controlled by the DISKCACHE statement. But your CONFIG.SYS will contain a DISKCACHE line in any case, even if your system uses only HPFS—after all, floppy disks use FAT. On HPFS systems, cache values are set by parameters in the HPFS.IFS statement. Optionally, you can use a separate CACHE program for extra fine-tune control.

Versions of DISKCACHE before OS/2 Warp required you to set a specific number for the cache size. That parameter is replaced by a D (standing for *dynamic* or *default*) in OS/2 Warp. The cache size is based on the amount of RAM that OS/2 finds in the machine when it boots. For instance, in systems with more than 8MB of RAM, the cache value is set to 10 percent of the memory size, up to a limit of 4MB. While you can always specify a number here if you want, OS/2 usually does a good job at estimating the best value. You can use specific values if you need to squeeze the last bit of performance from a FAT disk cache, but if you're that concerned with performance, consider switching to the faster and more efficient HPFS. On an HPFS system, you might change the DISKCACHE values to minimize the size of the cache for FAT drives, especially if you rarely use the floppy disk drive.

If you provide explicit values, you can include both the amount of memory (in kilobytes) to allocate for caching and the maximum record size (the number of sectors OS/2 reads or writes at one time). The following line sets the disk cache at 512K with a maximum record size of 128 sectors:

```
DISKCACHE=512, LW, 128, AC:C
```

LW stands for *lazy-write*, permitting OS/2 to write cache memory to disk during idle time. In other words, OS/2 will give its primary emphasis to keeping the system responsive to your requests and will "catch up" on writing the data to the hard disk when you are not actively demanding attention. Thus, you—and your application—are in control instead of having to wait for disk I/O to complete. (The AC or AUTOCHECK parameter actually has nothing to do with caching; it simply controls on which drives CHKDSK should run automatically when the system is improperly shut down—when you lose power or the computer crashes, for example.)

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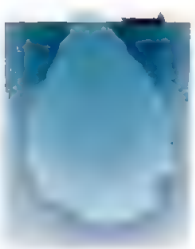

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HPFS's caching is sophisticated and complex, taking advantage of the greater amount of information that HPFS maintains about the file system. If the user requests information that isn't currently in the cache, HPFS selects the *least recently used* (LRU) block, writes the data within that block to disk if necessary, and then fills the block with the requested data. Thus, often-used data has a high likelihood of already being in memory—and your system responds faster. HPFS caches directory structures as well as files, so OS/2 can find a file's location without having to access the hard disk.

On an HPFS system, CONFIG.SYS will include a line similar to the following:

```
IFS=C:\OS/2\HPFS.IFS /CACHE:512
➥/CRECL:4 /AUTOECHECK:D
```

The /CACHE parameter defines the size of the HPFS cache in kilobytes, and /CRECL defines the maximum record size, also in kilobytes. There are no hard and fast rules when it comes to cache size, but the recommended values are based on the amount of RAM in your system. If you have 8MB of RAM, the recommended value is 1,024K; with 12MB, that value is 1,536K; with 16MB or more, the recommended value is 2,048K.

If your system is mixed—you use both FAT and HPFS partitions—adjust the amount of HPFS cache based on the percentage of hard disk real estate devoted to HPFS versus FAT and based on the amount each partition is used.

A separate utility called CACHE can further define parameters for HPFS caching. This command is normally specified as part of a RUN statement in the CONFIG.SYS file, though you could also enter it at a command prompt. Each CACHE parameter is handled in a separate statement, so you might include lines like the following in your CONFIG.SYS:

```
RUN=C:\OS2\CACHE.EXE /MAXAGE:40000
RUN=C:\OS2\CACHE.EXE /DISKIDLE:30000
RUN=C:\OS2\CACHE.EXE /BUFFERIDLE:30000
```

MAXAGE tells OS/2 to write to disk anything that has been in cache memory for the specified number of milliseconds. DISKIDLE controls the number of milliseconds OS/2 should wait before writing the cache to disk, and BUFFERIDLE sets the amount of cache buffer idle time, in milliseconds. A fourth parameter, /LAZY:OFF, can turn off lazy-writes, but that's rarely desirable because this reduces performance.

UNDOCUMENTED CONFIG.SYS STATEMENTS

OS/2 has its own set of "lightly" documented features and options relating to CONFIG.SYS. Information about the statements pertaining to these features does exist, but you're unlikely to stumble across it in the documentation. We'll discuss a couple of statements that can be useful in particular situations.

Sooner or later you may encounter a trap error while using OS/2, caused either by software or by hardware. A *trap* is the method the computer's microprocessor uses to inform the operating system that an improper condition has occurred, such as a protection violation or a memory parity error. When a serious trap error occurs, an error message appears on the screen and the system halts. If you use an OS/2 system for a server or you run an OS/2 BBS, you usually can't let the system stay down; even if it crashes in the middle of the night, you want it to restart immediately. If that's the case, include the line REIPL=ON in the system's CONFIG.SYS, and the system will automatically reboot when a trap condition occurs.

If you support OS/2 users remotely and one of those users has a system crash, it's hard to troubleshoot effectively. It's difficult to figure out what a user sees on a pop-up error window, and reporting the error to the programmer requires copying down a tedious list of numbers. But if you include the line SUPPRESSPOPUPS=C: in users' CONFIG.SYS files, the pop-up error information will be logged to a file (POPUPLOG.OS2) on the drive specified, making troubleshooting much easier.

FURTHER STUDY

CONFIG.SYS files don't stay simple for long. Adding applications and network support causes them to grow considerably. While an initial CONFIG.SYS may run about 75 lines, my own file is currently 146 lines long. Some applications add information to the environment with SET statements, and many add drivers as well. Happily, these rarely conflict with one another; OS/2 is smart enough to figure out how to manage them. And not every CONFIG.SYS statement requires examination. For example, there's not much to say about the line that defines mouse support for your system.

If you want to learn more about CONFIG.SYS, check out these references:

- IBM's *Warp Redbook*; part number GG24-4426-00.
- IBM's Online Library OS/2 Collection, a CD-ROM chock-full of technical red books; order number SK2T-2176-00.
- The Warp Pharmacy (on the Internet at *http://www.teamos2.org/pharmacy/WarpPharmacy.html*), which lists solutions to both common and uncommon CONFIG.SYS problems.

The CONFIG.SYS file controls to an enormous extent the way your OS/2 system runs. The settings described here give you a start in determining what changes can optimize your system, but you'll definitely need to experiment to decide what works best for you. □

Esther Schindler is a senior contributing editor of OS/2 Magazine, *primary sysop of ZD Net's Executives Online Forum, and coauthor of SAMS' Teach Yourself REXX in 21 Days.*

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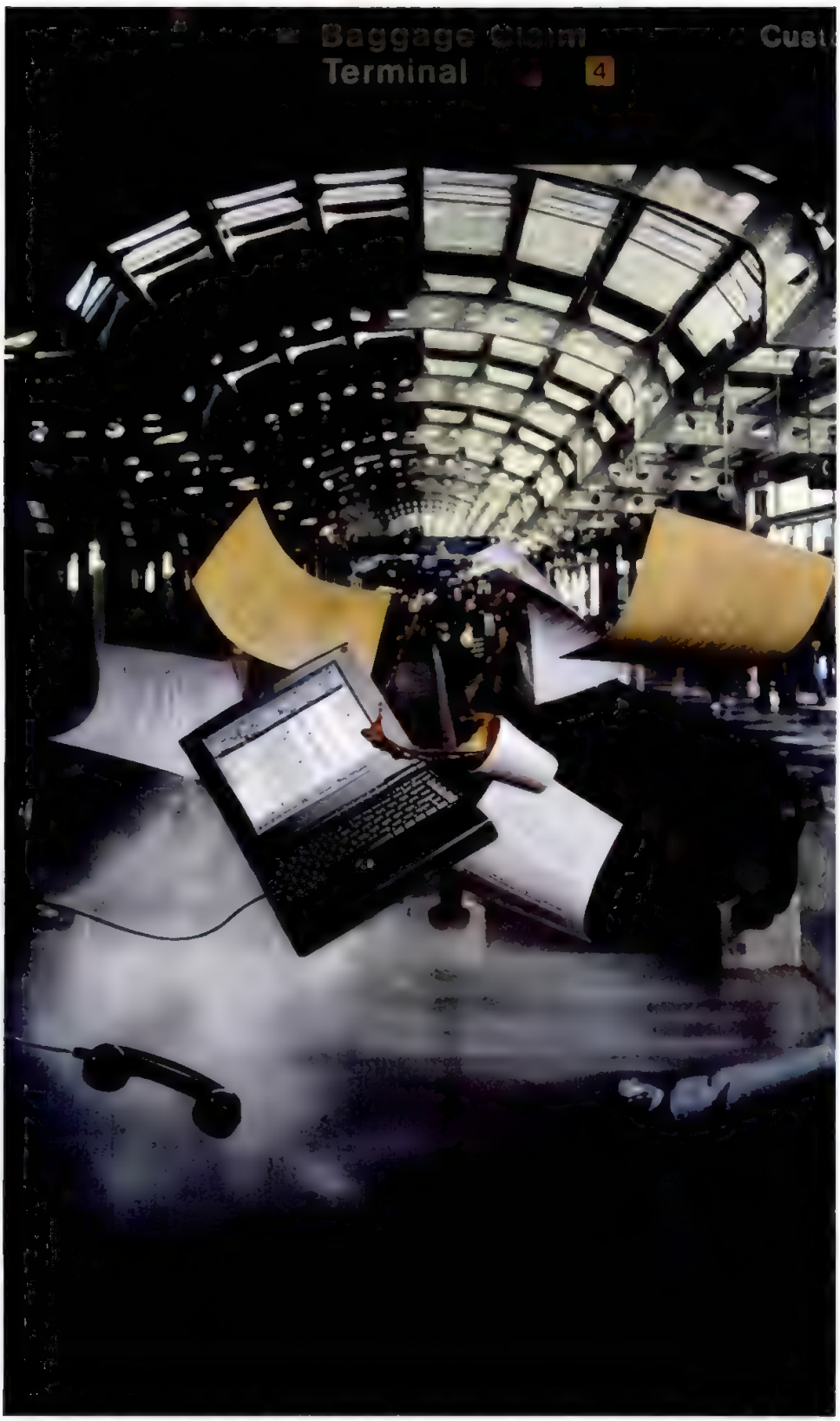

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By Michael J. Mefford

A Free Checkers Game for Your PC

Challenge a human opponent or pit your skills against the computer.

Checkers, known as *draughts* in England, is one of the world's oldest games. The fascination with the game stems from the simplicity of its rules yet complexity of play. Checkers has the intrigue of chess but is simple enough for players of all ages. And like chess, checkers is purely a game of skill. Games that use playing cards or dice include an element of chance, but with checkers, the best player *always* wins. This issue's free program is a software version of checkers that can be played with two people or against the computer.

You can obtain Checkers by downloading it from PC Magazine Online or by mail. Refer to the sidebar "Guide to Our Utilities" for details. The source code for Checkers, which was written in Borland's visual programming tool Delphi, is also provided for those interested in seeing how it works.

THE RULES OF CHECKERS

The basic rules of checkers are as follows. Players take turns making moves. Black moves first. To win, all your opponent's checkers (or "men") must be captured or blocked so that they cannot move. The player making the last move of the game wins. In Play Computer mode, the computer plays red and you play black. You therefore get the advantage of going first.

At the start of the game all checkers are "uncrowned" men and may advance toward the opposite side of the board diagonally from one black square to another vacant black square. If a diagonal square is unoccupied, the checker can move to that square. If a diagonal square is occupied by an opponent with a vacant square beyond, the checker *must* be jumped over and captured and removed from the board. If the landing square presents the same situation, successive jumps in a straight or zigzag direction *must* be completed in the same play. The one exception is that when an uncrowned man moves or jumps into the king row, it can't leave until the next turn. When there is more than one way to jump, you can choose which jump to take. You cannot jump over your own men. When a checker reaches the opposite side of the board, the man is crowned and becomes a king. On subsequent plays, a king can move or jump in any diagonal direction on the board. The must-jump rule is often unknown to new or casual players of the game. The rule, however, is integral and important in game strategy.

Learning the rules of checkers is just the first step in learning to play. Some fundamental winning strategies are discussed below. While playing Checkers, you can obtain information on rules and strategies by pressing the Help button.

PLAYING CHECKERS

To install Checkers, copy the program files CHECKERS.EXE and CHECKERS.HLP to a subdirectory on your hard disk and create an icon for Checkers in your shell. Checkers is a 16-bit Windows program and will run under Windows 3.1, Windows 95, and Windows NT.

When you launch Checkers, you'll see a picture of a checkerboard, set up for a new game, with program option controls along the right edge (see Figure 1). You can play Checkers in the standard way, one player against another, or test your skills by playing against the computer. Under the label "Against:" you'll see two buttons. Click on the button with a picture of a computer to play in one-player mode against the computer; click on the button with a picture of a person to play against a human opponent. When you first start Checkers it is in one-player mode.

Play is accomplished by dragging a checker to a new square using the mouse. When you drag a checker, the cursor changes from a standard pointing arrow to a hand that grasps the checker. When you drag a checker to a square where it can legally land, the grasping hand opens up, indicating you can drop the checker there. If you attempt to drag a checker that cannot legally be moved, the cursor remains an arrow and does not grasp the checker. The inability to pick up a checker is the only clue that it is an illegal move; there are no annoying beeps.

Checkers keeps a record over sessions of the number of wins for both the red and black checkers. You can clear this record back to zero by clicking the Clear button. You can quit Checkers by either clicking the Quit button or pressing Esc.

WINNING STRATEGIES

A checkers tyro will often try to avoid being jumped at all costs—this is a fatal mistake. Leaving all the king-row men unmoved in hopes of preventing the opponent from making a king is another common beginner's error. Forcing jumps and placing king-row men in play are parts of a strong strategy. I'll explain while I give six of the basic winning strategies of checkers.

1. Play your men toward the center of the board in a wedge-shape formation. Each advanced checker should be backed up so that the ranks are solidly massed. You can then attack your opponent on any weak side. If your opponent controls the center of the board, it is generally wise to attack and exchange pieces (provided they are amply backed up). This lets your capturing men take over the center squares. The key squares are 14, 15, 18, and 19 (see Figure 2). The strongest opening move is 22-18; the weakest is 24-20.

2. In general, avoid moves to the side of the board. This handicaps a checker as it subsequently can move only in one direction—away from the side. Occasionally it's okay to move to the side when you can set up your opponent for a two-for-one shot trap or to avoid being jumped without a return exchange jump.

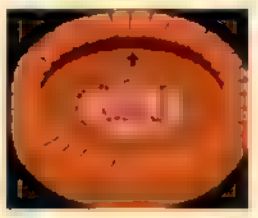
3. The first player to obtain a king has an advantage since it can attack from behind.

4. The single corners are squares 4 and 29. The double corners are squares 1 and 5, and 28 and 32. Play from your single corner and

IN THIS ISSUE

Checkers

Checkers is a 16-bit Windows program and will run under Windows 3.1, Windows 95, and Windows NT. This software version of checkers can be played with two people or against the computer.



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attack your opponent's double corner. Keep your double corner as strong as possible as this is the easiest place for your opponent to make a king. If the double corner is vacated, the opponent player can easily slip in from 28 to 32 or 5 to 1, making a king and escaping back out the same way.

Players often find themselves trapped, however, if they make a king in the single corner square 4 or 29. For example, if red is on 21 and 30, black can move 22, 25, and 29, making the king. While black is being crowned, however, red can remove the bridge checker on 21 to 17, and by doing so trap the black king.

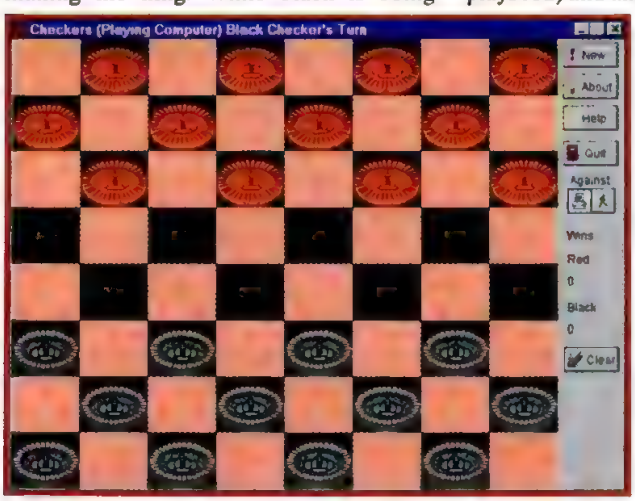


FIGURE 1: *When you launch Checkers, you'll see a picture of a checker board, set up for a new game, with program option controls along the right edge.*

5. Contrary to common belief, it is not a good strategy to hold all four king-row squares in order to keep your opponent from making a king. Doing so lessens your strength since you will have less men to attack with. Instead, defend your king row with only two men; leave a man on every other square starting with the double corner. For red these defense squares are 1 and 3; for black they are 30 and 32.

With this defense it takes two checkers for your opponent to make a king. For example, if red stays on 1 and 3 and vacates 2 and 4, black needs to first build a bridge by placing a checker on 10 to keep the second checker from being jumped as it moves into 2 to make a king. Getting two checkers safely down board for this maneuver takes precious time, giving your opponent a chance to come from behind and attack with his or her own king.

6. When you are a checker ahead, it is wise to judiciously exchange jumps to reduce forces. Whittling down the total number of checkers on the board reduces the number of possible moves and the chances of your making a mistake and losing your checker-ahead advantage.

CHECKERS' INNARDS

The most interesting challenge in writing Checkers was in getting the computer-play logic to reflect winning checkers strategies and play a respectable game. To accomplish this goal, I created a series of prioritized decision-making steps. These decision steps are applied against possible-moves information that is gathered before each move. The database consists of two arrays: all possible jumps red checkers can take (the computer always plays red) and all possible moves for each of the red checkers that don't involve jumps.

Both the Moves array and the Jumps array store the move-from square, the move-to square, and the type of checker (uncrowned or king). In addition, the Moves array stores a switch that indicates whether the checker is "at risk."

A checker is considered *not* at risk under two conditions. First, if it can't be taken where it stands or where it moves to, it is not at risk. Second, if it *can* be taken where it stands or where it moves to, it is not at risk if it gets a return shot that keeps the score even. If neither of these conditions are met, the checker (and the game) are at risk because black will be a checker ahead on its next move.

To determine if a checker is at risk, Checkers looks at the four squares diagonal to each red checker to see what black checkers, if any, can jump it. Although the principle is simple, the logic gets more complicated than you might think. A red checker can be attacked from the front two diagonals by either a black uncrowned man or a black king, and from the back two diagonals by a black king. The logic must also check for multiple jumps—all the while ensuring that the checker doesn't jump off the board. The source code for EvaluateRisksMoved() is not shown here, but is available from PC Magazine Online.

Checkers' decision hierarchy, composed of seven prioritized strategies, is encoded in a procedure called Computer() (see Figure 3). Computer() looks at each strategy in turn and sees if it can find any jumps or moves that meet the criteria for that strategy. Often there is more than one jump or move that meets the criteria. Each time it finds one, it stores the index for that jump or move in an array called MoveIndex. If there are jumps available, these indexes point into the Jumps array; otherwise they are indexes into the Moves array.

IndexCount holds the number of jumps or moves stored in MoveIndex as it moves through the decision hierarchy. If none were found, Computer() tries the next best strategy. Otherwise, Computer() chooses its move from among them, and the index for the selection is stored in ComputerIndex. ComputerIndex, like MoveIndex, is an index into either the Jumps array or the Moves array, depending on whether any jumps are available. Until Computer() decides on a move, ComputerIndex has a value of -1.

ANY JUMPS?

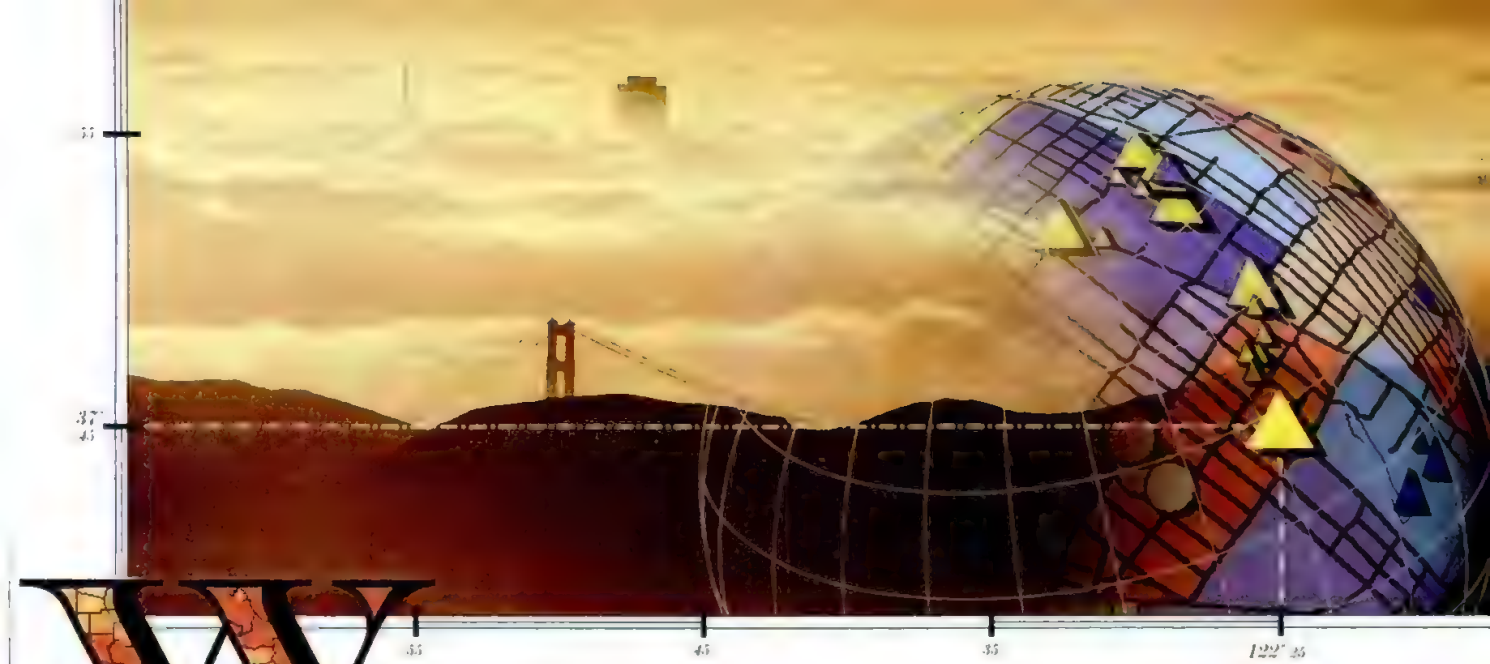
Remember, if you have a jump, you *must* take the jump, so Computer() is obligated by the rules to first consider its jumps. Kings are more powerful than uncrowned men, so if possible, Computer() attacks them in preference to uncrowned men. If there is more than one jump that takes a king, one king is randomly chosen as the victim. If all the jumps capture uncrowned men, then a jump is selected randomly.

Checkers doesn't look farther than the one jump and thus doesn't know to choose multiple jumps over single jumps. There's a good chance it will choose the better jump by accident, however, since there are not usually many jumps to choose from. While it would have been nice to correct this short-sightedness, the logic required would have been too complex for this utility.

CHECKER AT RISK?

If there are no jumps available, then Computer() is free to consider non-jump moves and looks to see if any red checkers are "at risk." Remember, a current threat is not the sole criteria for being "at risk." If red gets a return shot after being jumped, the checker is not considered at risk. Also, if the checker is doomed no matter where it moves, Computer() doesn't bother moving it because it would

FIGURE 2: *In this standard numbered checker board, red's home is on top (positions 1 through 12) and black's is on the bottom (positions 21 through 32).*



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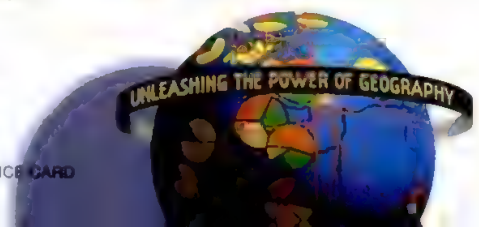

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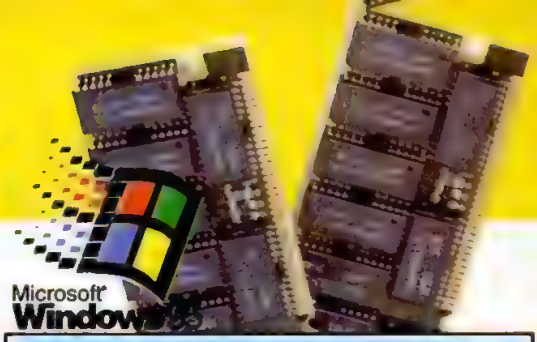

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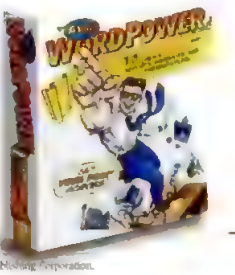

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```
procedure TMainForm.Computer;
var
  i : integer;
  MoveIndex : array [0..47] of integer;
  IndexCount : integer;
  Row : integer;
  ZeroRiskIndex : integer;
begin
  ComputerIndex:= -1;

  if JumpsCount > 0 then
  begin
    IndexCount:= 0;
    for i:= 0 to JumpsCount - 1 do
      if Board[Jumps[i].FromCol + ((Jumps[i].ToCol -
      ➥Jumps[i].FromCol) div 2),
        Jumps[i].FromRow + ((Jumps[i].ToRow -
        ➥Jumps[i].FromRow)) div 2]
          = BlackKing then
      begin
        MoveIndex[IndexCount]:= i;
        inc(IndexCount);
      end;
    if IndexCount > 0 then
      ComputerIndex:= MoveIndex[Random(IndexCount)]
    else
      ComputerIndex:= Random(JumpsCount);
  end;

  if ComputerIndex = -1 then
  begin
    EvaluateRisksMoved(false);
    IndexCount:= 0;
    for i:= 0 to MovesCount - 1 do
      if Moves[i].Risk > 0 then {checker is in danger}
      begin
        MoveIndex[IndexCount]:= i;
        inc(IndexCount);
      end;
    EvaluateRisksMoved(true);

    ZeroRiskIndex:= 0;
    if IndexCount > 0 then
      for i:= 0 to IndexCount - 1 do
        if Moves[MoveIndex[i]].Risk = 0 then {move it out
        ➥of danger}
        begin
          MoveIndex[ZeroRiskIndex]:= MoveIndex[i];
          inc(ZeroRiskIndex);
        end;

    if ZeroRiskIndex > 0 then
      ComputerIndex:= MoveIndex[Random(ZeroRiskIndex)];
  end;

  if ComputerIndex = -1 then
    for i:= 0 to MovesCount - 1 do
      if (Moves[i].Checker = RedChecker) and
         (Moves[i].ToRow = 7) then {make a king}
        ComputerIndex:= i;

  if ComputerIndex = -1 then
  begin
    IndexCount:= 0;
    for i:= 0 to MovesCount - 1 do
      if (Moves[i].Checker = RedKing) and
         (Moves[i].Risk = 0) then {chase last checker
         ➥ move with a king}
        if abs(Moves[i].ToCol - LastToCol) +
           abs(Moves[i].ToRow - LastToRow) <
           abs(Moves[i].FromCol - LastToCol) +
           abs(Moves[i].FromRow - LastToRow) then
             begin
               MoveIndex[IndexCount]:= i;
               inc(IndexCount);
             end;
    if IndexCount > 0 then
      ComputerIndex:= MoveIndex[Random(IndexCount)];
  end;

  if ComputerIndex = -1 then {try to wedge up the center}
  begin
    IndexCount:= 0;
    Row:= 7;
    for i:= 0 to MovesCount - 1 do
      if (Row >= Moves[i].ToRow) and
         (Moves[i].Checker = RedChecker) and
         (Moves[i].Risk = 0) and

        (((Moves[i].ToRow > 1) and
          (Moves[i].ToCol > 1) and
          (Moves[i].ToCol < 6)) or

         ((Moves[i].FromRow = 0) and
          (Moves[i].FromCol <> 1) and
          (Moves[i].FromCol <> 5))) then
      begin
        MoveIndex[IndexCount]:= i;
        inc(IndexCount);
        Row:= Moves[i].ToRow;
      end;

    if IndexCount > 0 then
      ComputerIndex:= MoveIndex[Random(IndexCount)];
  end;

  if ComputerIndex = -1 then {move any checker except
  ➥0,1 or 0,5}
  begin                          {with zero risk}
    IndexCount:= 0;
    for i:= 0 to MovesCount - 1 do
      if (Moves[i].Risk = 0) and

        ((Moves[i].FromRow > 0) or
        ((Moves[i].FromCol <> 1) and
         (Moves[i].FromCol <> 5))) then
          begin
            MoveIndex[IndexCount]:= i;
            inc(IndexCount);
          end;
    if IndexCount > 0 then
```

continues

FIGURE 3: *The function Computer() contains the logic that Checkers uses to select its next move.*

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Dell's featured computer artist is Marco Marinucci of San Francisco, CA.

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```
    ComputerIndex:= MoveIndex[Random(IndexCount)];
end;

if ComputerIndex = -1 then {move any checker with zero
➥ risk}
begin
  IndexCount:= 0;
  for i:= 0 to MovesCount - 1 do
    if (Moves[i].Risk = 0) then
    begin
      MoveIndex[IndexCount]:= i;
      inc(IndexCount);
    end;
  if IndexCount > 0 then
    ComputerIndex:= MoveIndex[Random(IndexCount)];
end;

if ComputerIndex = -1 then {been out smarted; just make
➥a move}
  ComputerIndex:= Random(MovesCount);

TimerCount:= 0;
Timer1.Enabled:= true;
end;
```

FIGURE 3 (CONT.)

be a wasted move. To evaluate both these situations, Computer() must look at not only the current risk, but also the risk after moving.

The first step is to compute the before-move risk and store the result in the Moves array. This is done by calling the function EvaluateRisksMoved() with a parameter of False, indicating that a move has not yet taken place. Then Computer() finds all moves with a non-zero risk and stores their indexes in MoveIndex.

EvaluateRisksMoved() is then called again, this time with a parameter of True. This causes the risk variable in the Moves array to be overwritten with the after-move risk. All the moves stored in MoveIndex at this point are for red checkers that are currently at risk. The risk variable now says whether the move will take the checker out of danger. Computer() uses this information to rewrite the MoveIndex array. If the after-move risk is zero, the ZeroRiskIndex is incremented, and the move is written to the MoveIndex array. Lastly, Computer() checks the value of ZeroRiskIndex to see if there are any checkers currently at risk that can be moved out of danger. If so, one is randomly chosen.

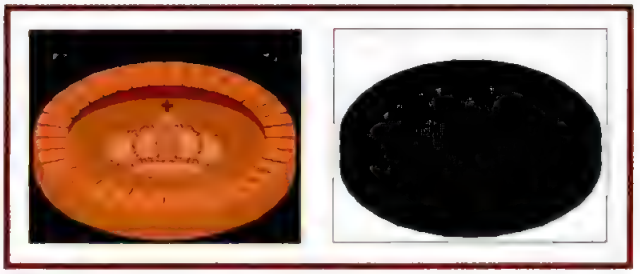

FIGURE 4: *The mask is a TImage object with a black silhouette of the checker on a white background that is the same size as the checker TImage object.*

MAKE A KING

If there are no jumps and no checkers at risk, Checkers then looks to see if a red man is in position to move into the opponent's king row to be crowned. A king is powerful, so this move comes first in priority after protecting from possible losses. The logic is simple: Computer() looks to see if there are any single red men on the row before the king row, and if so, moves in if there is a vacant square in the king row.

USE KING TO CHASE

If red has a king, it takes advantage of that powerful piece by using it to chase the last black checker moved. If there is more than one red king or more than one move for a king toward the black piece, the move is selected at random from the possibilities. Of course, a king will abandon the chase before it puts itself at risk.

This piece of logic was the last that I put in. I knew that Computer() needed to take advantage of its kings, but I didn't know how to give it those smarts. I thought about the many considerations that race through my head when I play an opponent—how I usually look ahead several moves. But looking more than one turn ahead involved extremely complex programming. Then I noticed that when I made a king, my opponent was usually racing to make a king at the same time. And I noticed that if I could chase the opponent's would-be king from behind, before he could get in position to make a king, I could get an advantage. In short, the last black checker moved is almost always a would-be king.

I was delighted to find that by simply chasing the last black checker moved, Computer() became aggressively tough without complicating the program. I also discovered, as an added bonus, that while chasing a particular checker, the king would often encounter, quite by accident during the pursuit, other isolated black men on the board and place them in danger.

WEDGE UP CENTER

Making a king and then taking advantage of it is mid- and end-game logic—it takes a while for a checker to reach the other end of the board. At the beginning of the game, king-related moves won't be available. A route to the king row is forged by creating a wedge of attacking men up through the center of the board. The men in front have to be backed up, creating the wedge, so that exchanges can safely be made.

To implement this positional strategy, Computer() looks for moves that end up in the center four columns, starting from the back row and progressing forward. Looking from back to front ensures that the wedge is properly backed up; only when the wedge has advanced so that the back cannot be moved up further does the battle front advance. The Moves array is in row order, so no special logic is needed to do this.

In the first few rounds of play, this logic causes Computer() to move to squares 14, 15, 18, and 19. If Computer() has to draw on men from the king row to back up the wedge, only those men in squares 2 and 4 are allowed to advance. This keeps squares 1 and 3 guarded.

GETTING DESPERATE

If Computer() can't make a center move, it next considers side moves by looking for any move that involves zero risk. If possible, it avoids moving out of king row squares 1 and 3. However, if the only safe moves are out of squares 1 and 3, Computer() moves these checkers. Finally, if no move is safe, Computer() gives up on strategy and moves at random, regardless of risk.

CHECKER MASK

Checkers uses the CopyRect method of the Delphi TCanvas object to achieve flicker-free, smooth, and responsive dragging of a checker around the board. CopyRect is an encapsulation of the Windows API function BitBlt (short for Bit Block Transfer), which copies a rectangular portion of an image from one device context to another. The TCanvas object handles nearly all functions related to device contexts. In Checkers' case, both the source and destination canvases belong to TImage objects representing the

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board itself and different types of checkers.

Taking CopyRect's three parameters in reverse order, the source rectangle specifies a rectangular area from which pixels will be copied, and the source Canvas is the canvas from which these pixels are drawn. The destination rectangle is the rectangular area within the calling Canvas object to which the pixels will be copied. The size of the rectangles that Checkers copies is the same size as a checker square. Keeping the drawing area down in size instead of redrawing the entire checkerboard each time results in fast response to dragging.

The action of moving a checker around the board consists of a number of tiny but distinct moves. Each move consists of four steps, and each step uses the CopyRect method. The first step is to wipe out the image of the checker in its current position by overwriting it with the contents of a temporary TImage object named SaveImage. SaveImage holds a stored image of the location the checker currently occupies, but without any checker there. Next, SaveImage is updated with a rectangular image of the checkerboard at the moving checker's next location, including any stationary checkers. This image will be used in step one of the next move.

```
with SaveImage do
begin
  CheckerBoard.Canvas.CopyRect(Bounds
  ➥(OldX, OldY,
    ClientRect.Right,
ClientRect.Bottom), Canvas,
ClientRect);
  BoardRect:= Bounds(XCord, Ycord,
    ClientRect.Right,
ClientRect.Bottom);
  Canvas.CopyRect(ClientRect,
CheckerBoard.Canvas, BoardRect);
end;
```

After the moving checker is erased and the rectangular image of its new location is saved, the checker can be drawn in the new location. CopyRect, as its name suggests, only draws rectangles, however, and the checkers are ovals. To get just the checker part of the rectangle on the board, Checkers uses a mask. The mask is a TImage object with a black silhouette of the checker on a white background that is the same size as the checker TImage object (see Figure 4). The mask is ANDed onto the checkerboard first by setting the CopyRect CopyMode to cmSrcAnd. The logical AND operator requires that the respective bits of *both* the mask *and* the checkerboard be a 1 in order for the checkerboard bits to stay a 1. Since black is all 0s and white is 1s, ANDing the mask ends up leaving a black hole (all 0s) on the checkerboard the same size as the checker, and the board background around the hole is unchanged.

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8. **SPAD** Enhanced Windows Notepad
9. **FDDLLS** Finds dead DLLs
10. **FINDIR** Analyzes IRQ lines

The checker background is black, just the opposite of the mask. After the black hole is placed on the checkerboard, the checker can be ORed onto the checkerboard by setting the CopyMode to cmScrPaint. The logical OR requires that *either* the bits of the source *or* the destination be a 1 in order for the destination bit to stay a 1. ORing the checker fills the hole with the checker and leaves the checkerboard background around the hole unchanged.

```
with CheckerBoard.Canvas do
begin
  CopyMode:= cmSrcAnd;
  if (Checker = BlackChecker) or
  ➥(Checker = RedChecker) then
    CopyRect(BoardRect,MaskSingle
    ➥.Canvas, MaskSingle.ClientRect)
  else
    CopyRect(BoardRect, MaskKing
    ➥.Canvas, MaskKing.ClientRect);
  CopyMode:= cmSrcPaint;
  CopyRect(BoardRect, Checker.Canvas,
  ➥Checker.ClientRect);
end;
```

Checkers uses four separate bitmaps for the red and black checkers and kings. Only two masks are needed, however—one for a regular checker and one for a king

CUSTOM CURSORS

An application's Screen.Cursors property has 16 predefined cursors that include the familiar Arrow for pointing; the NoDrop cursor, which is a circle with a diagonal line through it; and the Drag cursor, which is an arrow over a small box. The pointing Arrow is fine for Checkers, but I wanted the NoDrop and Drag cursors used for moving the checkers to be hands. Each application has its own resource file with the same name as the application and an extension of .RES. For Checkers the file is called CHECKERS.RES. At first I thought I could open that file with the Delphi Image Editor and create the new NoDrop and Drag cursors, but that didn't work. Once I saved the resource file I could not access the cursors.

Neil Rubenking, *PC Magazine*'s technical editor, set me straight on how it's done. The cursors have to be created in a resource file by the Image Editor all right, but the resource file has to be a separate file from the application's resource file. With this enlightenment, I created the GRABHAND and OPENHAND cursors in a new resource file I called CURSORS.RES. The resource was then added to the implementation part of the main form's unit as shown here with the $R compiler directive to compile the cursors into the application. The cursors are then loaded into the system with the Windows API LoadCursor function. The LoadCursor function loads the specified cursor resource from the executable file associated with the given application instance. Then these lines in the Checkers FormCreate event handler assign the cursor handles to the corresponding elements of the Screen object's array of cursors:

```
Screen.Cursors[crNoDrop]:=
➥ LoadCursor(hInstance, 'GRABHAND');
Screen.Cursors[crDrag]:=
➥ LoadCursor(hInstance, 'OPENHAND');
```

Now when a checker is dragged, the Arrow cursor turns into the new NoDrop cursor, which is a hand grasping the checker. When the Checker is dragged over a place where it can legally land, the cursor turns into the new Drag cursor, which is an open hand encouraging you to release the checker.

THE GRID IS NOT A GRID

Checkers uses a TImage object for the checkerboard, on which alternating colored squares are drawn. When I first created Checkers, however, I used a TStringGrid instead of a TImage. A TStringGrid seemed to me the most appropriate component since it was already neatly divided into squares. I could have used the somewhat simpler TDrawGrid descendant, but also I wanted to take advantage of the TStringGrid feature that lets you attach a pointer to an object to each square. For Checkers, this would either point to the type of checker that was on the square or nil if no checker was on the square.

This design worked quite nicely except for one annoying fact. When a checker was dragged across the TStringGrid, it flashed instead of moving smoothly. The TStringGrid was refreshing underneath the checker while

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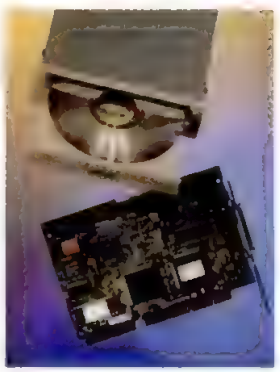

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the checker was being dragged. I tried several things to stop the flashing, but to no avail. Finally, I abandoned the TStringGrid and used the simpler TImage component. It wasn't too painful a rewrite. Mainly all I had to do was add a square-drawing routine, since a TImage isn't divided into squares, and I had to add a separate Board array that kept track of where the checkers were.

DRAWING THE CHECKERS

I created the checkers with CorelDraw. The reason I used CorelDraw instead of the Delphi Image editor is that CorelDraw is vector-based and better able to capture detail than the pixel-based Image editor. I used a checker from a game I have as a model for the classic checker crown face, holding the checker at an angle away from me as I drew it (see Figure 4).

When I was satisfied with the detail, I placed the checker on a black square and exported the selected checker as a .BMP file. The Corel export feature has a custom size option for the export. I selected 57 by 71 so the checker would fit exactly on the board size that I created.

I considered drawing the board also with depth perception by making the squares progressively smaller on each row higher on the screen. This also meant, however, that the checkers had to be made smaller as they appeared farther away on the board. It wasn't terribly hard to accomplish that, but the smaller checkers lost detail and didn't look very good.

The nuances of checkers are endless, and there are many ways you could make Checkers smarter. A good place to start might be to look for two-for-one shots. A more difficult enhancement would be to add the ability to look ahead more than one move. If you come up with some nifty computer-play additions, post a message in the Utilities section of the ZD Net Utilities/Tips Forum (GO TIPS). My CompuServe ID is 72241,161. Although Checkers is far from a checkers master, I knew I had accomplished my goal of making it a respectable player when my two editors said they had been unable to beat the computer. □

Michael J. Mefford is a contributing editor of PC Magazine.

GUIDE TO OUR UTILITIES

ABOUT CHECKERS. . .

DESCRIPTION Checkers is one of the world's oldest games. It has the intrigue of chess but is simple enough for players of all ages. And like chess, checkers is purely a game of skill—the best player *always* wins. This software version of checkers can be played with two people or against the computer.

USAGE To install Checkers, copy the program files CHECKERS.EXE and CHECKERS.HLP to a subdirectory on your hard disk and create an icon for Checkers in your shell. Checkers is a 16-bit Windows program and will run under Windows 3.1, Windows 95, and Windows NT.

When you launch Checkers, you'll see a picture of a checkerboard, set up for a new game, with program option controls along the right edge. Under the label "Against:" you'll see two buttons. Click on the button with a picture of a computer to play against the computer; click on the button with a picture of a person to play against a human opponent.

Play is accomplished by dragging a checker to a new square using the mouse. When you drag a checker, the cursor changes from a standard pointing arrow to a hand that grasps the checker. When you drag a checker to a square where it can legally land, the grasping hand opens up, indicating you can drop the checker there. If you attempt to drag a checker that cannot legally be moved, the cursor remains an arrow and does not grasp the checker. The inability to pick up a checker is the only clue that it is an illegal move; there are no annoying beeps.

Checkers keeps a record over sessions of the number of wins for both the red and black checkers. You can clear this record back to zero by clicking on the Clear button. You can quit Checkers by either clicking the Quit button or pressing Esc.

To review the rules of checkers and some winning strategies, press the Help button.

FILES

CHECKE.EXE—Just the program file.
CHECKE.HLP—The Windows help file.
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CHECKE.ZIP—All the source, program, and documentation files.

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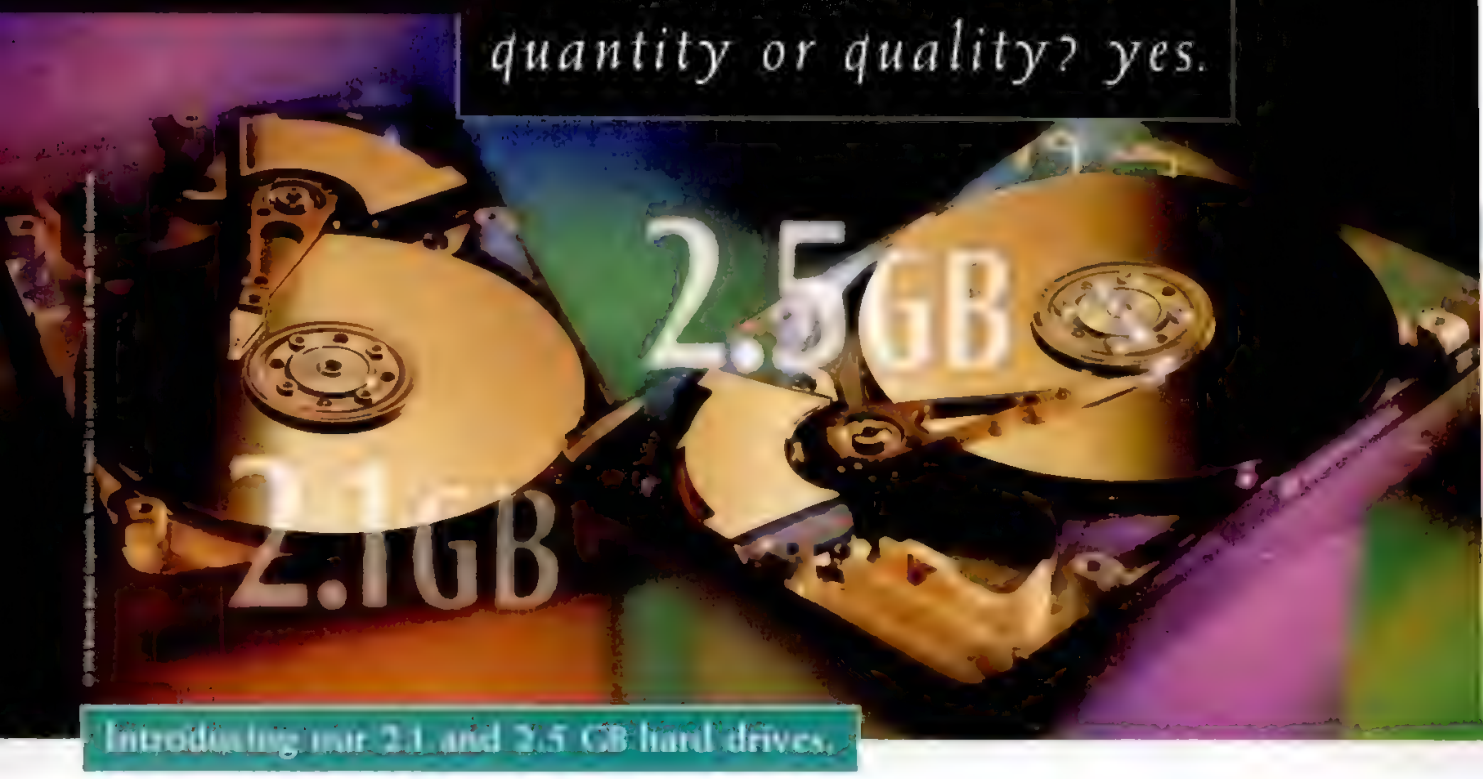

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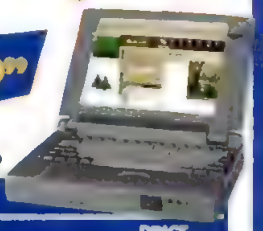

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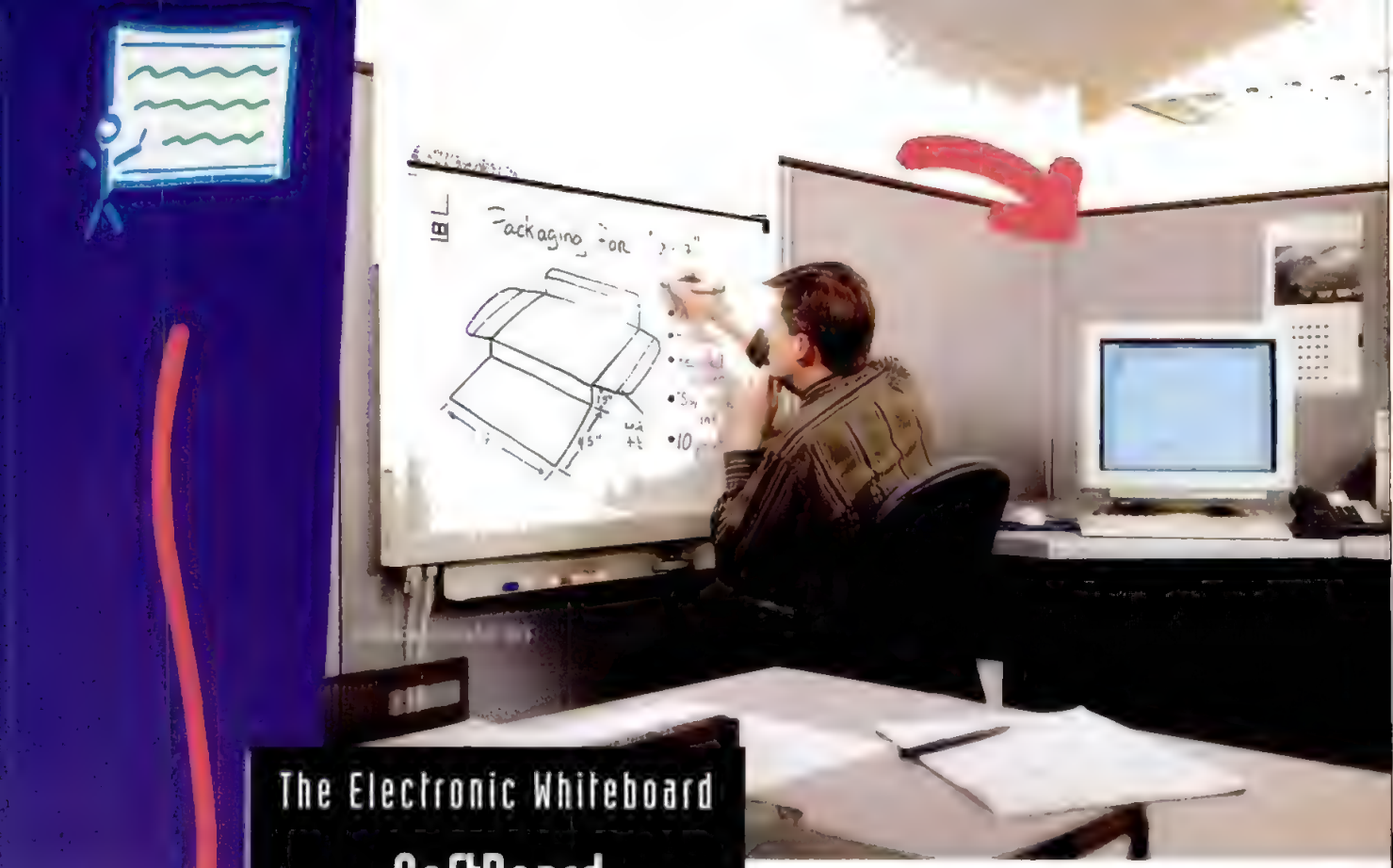

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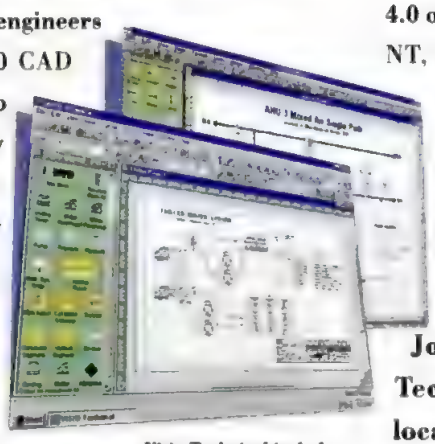

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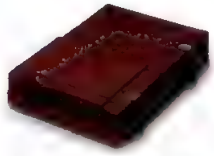

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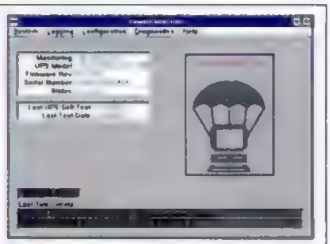

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			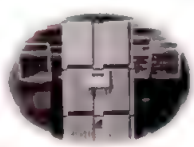
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PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

User-to-User

By Neil J. Rubenking

Tweak the Windows 95 Interface

Some Windows 95 users like to litter the desktop with shortcuts to favorite applications. Others want the opposite, a totally clean desktop, which is difficult to achieve. Some of the desktop icons are simple shortcuts you can delete or drag into the Start Menu. Others, such as Inbox, Recycle Bin, and Network Neighborhood, can't be moved off the desktop and can't be deleted without destroying access to the Windows feature they represent.

Microsoft's solution for spick-and-span desktops is TweakUI, included in a collection of free Windows 95 enhancements collectively known as Power Toys. One of TweakUI's features is the ability to remove everything from the desktop except the My Computer icon. TweakUI will optionally supply a file-based icon for desktop items, so you can place them in a folder or menu.

Another of TweakUI's many features is a less obtrusive overlay icon for shortcuts. By default, a shortcut's icon is overlaid with a boxed arrow in the lower-left corner. TweakUI lets you choose a near-invisible arrow, a custom overlay, or no overlay at all.

You can download Power Toys from the dedicated Web page at *www.microsoft.com/windows/software/powertoy.htm*.

Do note that although members of the Windows 95 development team wrote TweakUI and the other Power Toys utilities, these are not official Microsoft products. You can't call tech support and get help on them. But if you're determined to take control of the Windows 95 interface, you need these free utilities.—*Neil J. Rubenking*

Access the Windows 95 Desktop from the Start Menu

Here's a little Windows 95 trick I use to gain quick access to my desktop, regardless of the program I'm using.

- *Open the Startup folder, located in the Windows\Start Menu\Programs subdirectory.*
- *Click on File | New | Shortcut.*
- *Enter "desktop" for the command line.*
- *Click Next, then Finish.*
- *Right-click on the new shortcut and select Properties.*
- *Select the Shortcut page of the Properties dialog and change the Run mode to Minimized.*
- *Click OK to save your changes.*

Now when Windows 95 starts, it will load your desktop (minimized) so that you can switch back and forth from any application using the Taskbar.

DONALD E. MAYLE,
Pocono Summit, Pennsylvania

PC MAGAZINE: If you use a 27-inch monitor and keep individual programs small, you may find it hard to understand the point of this tip. But if your monitor is small and your programs are usually maximized, the desktop can be hard to get to. Sometimes finding a desktop icon can require closing five or six open programs as you drill down layer after layer searching for the desktop.

When you open the desktop shortcut that's described above, you'll see an ordinary-looking folder window containing *almost* everything that's on your desktop. The My Computer icon will be absent, as will the Recycle Bin icon and any other desktop icons that are not shortcuts. The item preceeding this one, entitled "Tweak the Windows 95 Interface," describes a utility that will let you convert all these balky icons except My Computer into file-based icons that *will* show up in the desktop folder. And if you close the desktop folder when you just meant to minimize it, don't worry! You can always bring it back by selecting it from the Start Menu.
—*Neil J. Rubenking*

Protect Your Environment from Snoops

HIDESET.BAT (Figure 1) can hide your DOS environment from prying eyes. Essentially, the batch file creates environment variables that write over those screen displays of themselves that result when the DOS SET command is entered, as well as an additional line of the environment as displayed by SET. On today's fast displays, the write-over occurs so

HIGHLIGHTS

HARDWARE Find out what could be causing a monochrome monitor to appear smeared when Windows is running. *Page 282*

WORD PROCESSING Word's AutoCorrect feature may be missing terms if it encounters the wrong kind of quotation mark. Here are two workarounds that solve the problem. *Page 290*

DATABASES An undocumented feature of Paradox for Windows provides a way to have files automatically deleted at shut-down. *Page 296*

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See index, page 282.

fast that most users wouldn't even notice. By using this procedure, you can hide portions of the DOS environment, and you can also create secret, hidden passwords that can be used by batch files. HIDESET.BAT hides a specifiable number of lines of the environment display and also illustrates the use of a "hidden" password.

Of course, someone could access the password and the entire environment by redirecting the output of the SET command to an ASCII file, but the only users likely to think of that are those already aware of this method of hiding the environment.

WILLIAM MUELLER,
Dedham, Massachusetts

PC MAGAZINE: The DOS environment is useful for storing small strings of data, but as this reader notes, it is totally accessible to anybody who gets a moment to sit at your keyboard and type SET. HIDESET.BAT hides important variables from the casual snoop. It relies on ANSI.SYS to perform its magical disappearing act. Without ANSI.SYS, HIDESET will simply burden your environment with a series of incomprehensible environment variables. With it, these same environment variables function as commands that execute when they are displayed by the SET command.

For each line to be hidden, HIDESET.BAT creates a variable whose name is the password followed by a letter from a to f, and whose value has the form

```
←[80D←[s←[K←[3A←[K←[u
```

Here the left arrow represents the escape character that begins every ANSI command. Let's break this string down into individual commands:

- ←[80D Move the cursor to the leftmost column
- ←[s Save the cursor position
- ←[K Delete to end of line
- ←[3A Move up three lines
- ←[K Delete to end of line
- ←[u Return to the saved position

By moving to the leftmost column and deleting to the end of the line, this command blanks out the corresponding variable's name. Next, it moves up to a particular line higher in the SET command's display and blanks that line as well. Finally, it returns to the line it started from.

All that remains is to leave the cursor positioned just below the last visible variable. HIDESET.BAT creates one final environment variable whose name is the password plus "x," and whose value is an ANSI command that deletes its own name, moves the

```
@echo off

 :: Requires two parameters. See ":help" section, below.
 :: %1 is a password (case insensitive).
 :: %2 is the # of lines hidden. This batch file will
 :: hide up to 6 lines.

:paramcheck
 if %2.==. goto help

:okparam
 if %2==0 %0 %1 /c
 if %2==/c goto clear
 if %2==/C goto clear
:else
 echo.
 if %2.==1. echo Hiding 1 line of the environment table.
 if not %2.==1. echo Hiding %2 lines of the environment
 ➥table.
 echo.

 set %1b=
 set %1c=
 set %1d=
 set %1e=
 set %1f=
 set %1x=

 ::
 ::

 set %1a=←[80D←[s←[K←[1A←[K←[u
 if %2==1 goto SetCL
 set %1b=←[80D←[s←[K←[3A←[K←[u
 if %2==2 goto SetCL
 set %1c=←[80D←[s←[K←[5A←[K←[u
 if %2==3 goto SetCL
 set %1d=←[80D←[s←[K←[7A←[K←[u
 if %2==4 goto SetCL
 set %1e=←[80D←[s←[K←[9A←[K←[u
 if %2==5 goto SetCL
 set %1f=←[80D←[s←[K←[11A←[K←[u
 if %2==6 goto SetCL
 ::
 :: NOTE: [80D and [K deletes the new set password from
 :: display
 :: [#A  writes over the original variables, starting
 :: with lowest line.
 ::
 set %1x=←[80D←[K←[13A
 echo.
 echo ERROR: Invalid Syntax: %%2 must be a # from
 echo ERROR: 1 to 6, not "%2".
 echo      Six lines of the environment have been hidden
 echo      (default for an error condition).
 echo.
 goto end

:SetCL
 :: Move the cursor back up to under the last visible
 :: environment variable.
 if %2.==1. set %1x=←[80D←[K←[3A
 if %2.==2. set %1x=←[80D←[K←[5A
 if %2.==3. set %1x=←[80D←[K←[7A
 if %2.==4. set %1x=←[80D←[K←[9A
 if %2.==5. set %1x=←[80D←[K←[11A
 if %2.==6. set %1x=←[80D←[K←[13A
 goto end

:clear
 set | find /i "%1A="">nul
 if errorlevel 1 goto PassWordErr
 set %1a=
 set %1b=
 set %1c=
 set %1d=
 set %1e=
 set %1f=
 set %1x=
 echo.
```

FIGURE 1: *This batch file creates environment variables containing ANSI commands that hide from one to six lines of the SET command's output to prevent snoopers from seeing your private data.*

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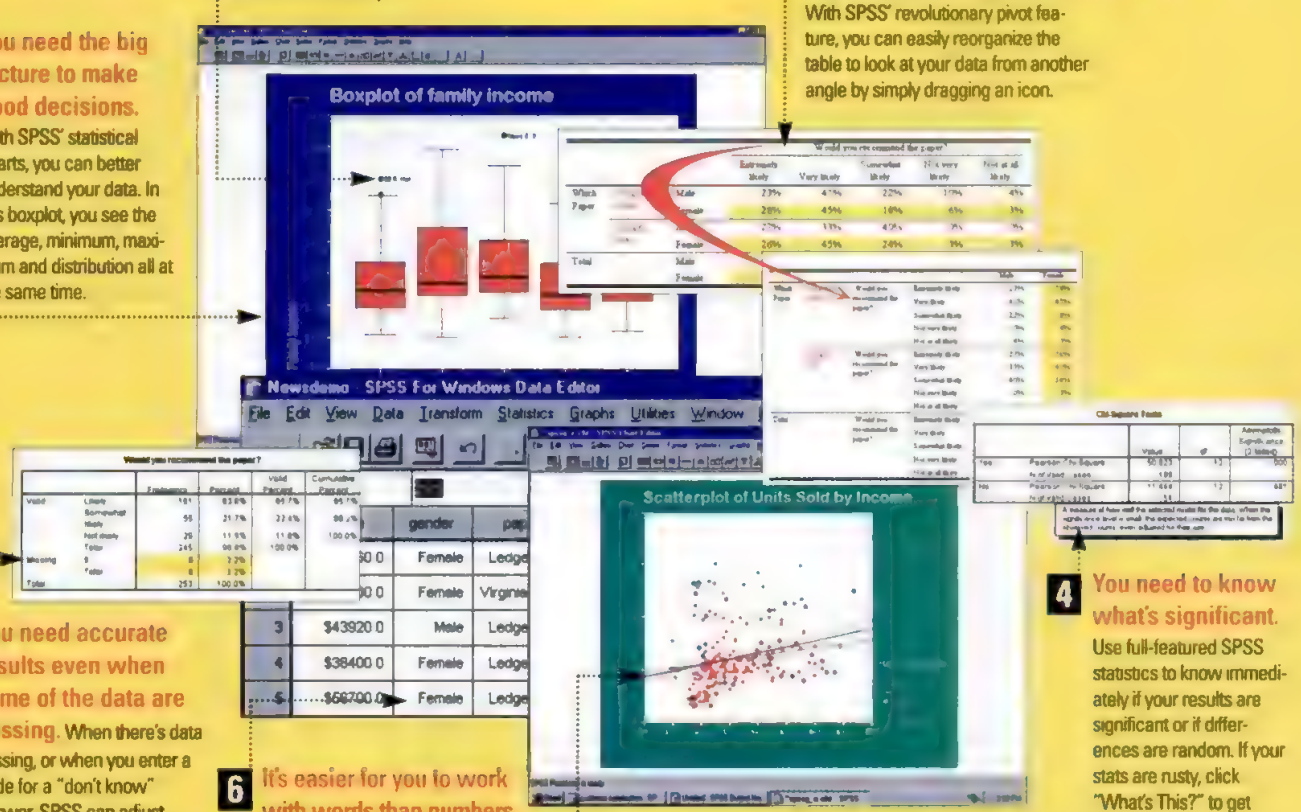

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```
                                                    (continues)
 echo All lines of the environment that were hidden with
 echo password "%1" are now made visible.
 echo.
 goto end

:PassWordErr
 set | find "←[80D←[s">nul
 if errorlevel 1 goto NotHidden!
 echo.
 if not errorlevel 1 echo The password is incorrect.
 ➥Try again.
 echo.
 goto end

:NotHidden!
  echo.
  echo The environment is already visible!
  echo Nothing to clear,
  echo since nothing is hidden!
  echo.
  goto end

:help
 echo.
 echo Usage:   HIDESET Password #Lines
 echo       OR HIDESET Password /c
 echo.
 echo    Password = All ASCII characters allowed which
 echo    are valid in a command line. Case insensitive.
 echo    #Lines   = Number of lines to hide,
 echo    up to 6 lines.
 echo    /c       = Clear the hiding of all lines.
 echo.

 echo   Example: HIDESET nosee 3
 echo.
 echo  Purpose: Hide the environment from unsavvy
 echo  but prying eyes.
 echo  Avoid detection of private environmental
 echo  variables;
 echo  for example: PASSWORD=DumbBoss, TEMPDIR=D:\XRATDGIF
 echo  or LASTWORK=FighterPilotGame.
 echo.

 echo     Notes: * This uses environment space.
 echo     The /E:# parameter of
 echo     command.com may have to be increased
 echo     in config.sys.
 echo     * Requires DOS 5.0 or later to
 echo      verify the password.
 echo     * The password (%%1) is case insensitive.
 echo.

:end
```

FIGURE 1 (CONT.)

cursor up a specified number of lines, and quits.

HIDESET.BAT is fairly expensive in terms of the environment space it uses. Each line hidden uses about 30 bytes plus the length of the password. Thus you may want to keep the password relatively short. The average snoop won't realize a password even exists, so FOO may be just as good a password as MOZILEX-OFUBA.

You can download this batch file from PC Magazine Online. See the sidebar "Guide to Our Utilities" in this issue's Utilities column for downloading instructions.

Change Drive Icons in Windows 95

Here's a very simple way to change the icon assigned to each hard disk: Create a file named AUTORUN.INF in the root directory of each hard disk or partition you want to customize and include a line in the file that contains the text [autorun]. Add another line to the file consisting of the text ICON= followed by the name of any .DLL or .EXE file that contains icons. Follow the filename with a comma and the number of the desired icon within the file. Then save AUTORUN.INF.

To use the fifth icon in SHELL32.DLL, for example, your AUTORUN.INF file might look like this:

```
[autorun]
ICON=C:\WINDOWS\SYSTEM\SHELL32.DLL,4
```

After creating these files, open Explorer by double-clicking on My Computer. You may need to select each drive and press F5 to update. This is tricky but it works!

FABIEN PETITCOLA,
Cambridge, United Kingdom

PC MAGAZINE: The purpose of AutoRun files is to let Windows 95 automatically install or run a CD-ROM when it's inserted into the drive. As Figure 2 shows, however, these files can serve other purposes as well. In the figure, the icons for drives C:, D:, and E: have been set to PIFMGR.DLL #2, SHELL32.DLL #41, and PIFMGR.DLL #20, respectively. Drives A: (floppy disk) and E: (CD-ROM) retain their default icons.

To preview the available icons, you can use the Change Icon dialog associated with the Properties dialog for DOS-based programs. Right-click on any DOS-based program or batch file and choose Properties from the menu. Select the Program tab in the Properties dialog box and press the Change Icon... button. Initially you'll see a list of the icons contained in PIFMGR.DLL. Scroll through the horizontal row of icons until you find one you like. Click to highlight it, then press the Left Arrow key repeatedly and count the number of icons before the one you chose. That's the icon number to use. Note that the first icon is number 0, the second is number 1, and so on. Exit the Change Icon dialog by pressing Cancel so as not to make any accidental changes.

If none of the icons in PIFMGR.DLL suit you, press the Browse button and select SHELL32.DLL instead. You can select any icon from any .DLL or .EXE file that contains icons.—*Neil J. Rubenking*

FIGURE 2: *You can assign nonstandard icons to your disk drives by specifying the icon in an AUTORUN .INF file placed in the root directory of the drive.*

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Anti-Smear Campaign

I recently purchased a new computer system and an Amdek AM432 VGA monochrome (white) monitor. The display works fine in DOS, but under Windows 3.x the image is smeared no matter which driver I use. The monitor manufacturer's technical support people said I need to change the graphics adapter's refresh rate to 12 Hz, and the computer manufacturer's technicians gave me no help at all. How can I get my new monitor to work correctly?

EDWARD DAVID HYMAN,
Harahan, Louisiana

PC MAGAZINE: My references confirm that the Amdek monitor is indeed a VGA monitor and should work with normal VGA signals. Two different possibilities represent the likeliest causes of the problem: an incorrect refresh rate or some physical flaw in the monitor.

If the smear effect you mention consists of the image folded over on itself or doubled up somehow, the refresh rate (also referred to as the vertical scan rate) would be the prime suspect. I'd bet there was some misunderstanding about the correct refresh rate—12 Hz means only a dozen screen repaintings per second, and this would create as much flicker as a slow strobe light. Standard VGA signals use 60- or 70-Hz refresh rates, depending on the display mode in use.

The tricky part is that Windows drivers have nothing to do with the refresh rate. The driver will choose a resolution and color depth (which in turn will have some impact on the scan rates), but the real control is handled by the graphics card itself and depends on how the card is configured.

Most graphics adapters come with a configuration or setup utility that lets you specify which monitor is attached to the card. Some even let you designate the scan rates to be used for different resolutions. I suspect that your graphics card is configured for a monitor capable of a refresh rate faster than standard VGA. The reason you don't see the problem in the DOS text screen but do see it under Windows is that the Windows display uses a graphics mode with a different resolution from the DOS text mode. The graphics card may be set to use a higher refresh rate for the graphics mode than your monitor can handle—this particular monitor can't handle anything above standard VGA. Try using the configuration utility to choose a generic VGA monitor for your graphics adapter to clean up the smear in Windows.

On the other hand, if the image is simply blurry under Windows, the monitor itself may be flawed. A badly focused electron gun could produce blurry images that you might not notice very much with simple characters on a black background—the standard DOS text screen. But on a full white background, the blurring could obliterate the image. If this is a more accurate description of the smearing problem, have your monitor checked for possible repair or exchange.—*Alfred Poor*

Old Program, New Printer

I use WordStar 6.0 and I want to stick with it, but I plan to buy a new printer soon and I'm worried about finding updated printer drivers. WordStar's LaserJet II driver works well with my current setup, but I don't know what I'll do when I get the new printer. Any suggestions?

ROBERT BENDER, *via fax*

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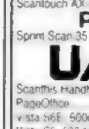

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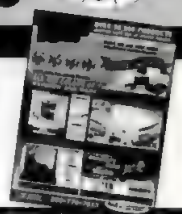

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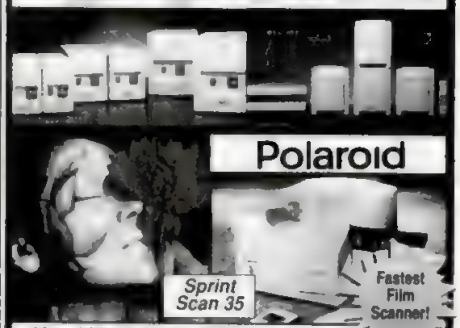

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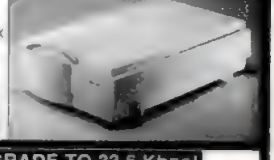

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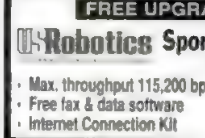

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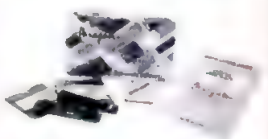

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	8MB	199015-001	$299
	16MB	199017-001	$379
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	8MB	147655-001	$279
	16MB	147657-001	$619
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	8MB	04H6194	$309
	16MB	04H6195	$599
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	8MB	07G1420	$289
	16MB	07G1421	$579
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	16MB	9804841-0001	$599
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	16MB	NW2028U	$579
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	16MB	PC-PA2014U	$599
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	16MB	PC-PA2023U	$549
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[illegible]	[illegible]	$185
[illegible]	[illegible]	$287
[illegible]	[illegible]	$167
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CIRCLE 014 ON READER SERVICE CARD

PC MAGAZINE: Newer laser printers should work just fine with the LaserJet II driver, because HP made later versions of its PCL language backward-compatible. This means you can purchase a new printer and it will work with your existing driver. You may, however, encounter some difficulties trying to use a font that the old driver does not know about. For example, scalable PCL fonts did not exist when the LaserJet II was current, so your driver may not work correctly with them.

Luckily, you can still get support for WordStar through SoftKey International. Drivers for Versions 6.0 and 7.0 are available for some of the newer PCL printers; you can download them from the company's bulletin board (770-514-6332).

You might want to consider a somewhat more extreme solution—moving to WordStar for Windows. Windows itself would provide the printer support in this case, and you'd probably wind up with better support for your printer.

An even more drastic approach to consider: Dump the old program. Most current word processing programs can import WordStar files, so you don't have to sacrifice your existing work. And many programs let you redefine keystroke assignments, so you can continue to use all the familiar and comfortable WordStar commands. (My friend and colleague M. David Stone used Microsoft Word for Windows to re-create the "WordStar diamond" and most of the Ctrl-K menu system using macros and dialog boxes.) There comes a point where you can't expect old DOS programs to keep pace with the many hardware advances we see every year.
—Alfred Poor

To Upgrade or Replace

I have an early 486/25 notebook computer with an 80MB hard disk that I've used only for DOS applications. I'd like to switch to Windows, but the machine is slow and doesn't have much hard disk space. Is there any reasonable way to upgrade the notebook, or does it make more sense simply to replace it?

DONAL MCNALLY, *Summit, New Jersey*

PC MAGAZINE: You don't mention how much memory the notebook has or whether you want to move up to Windows 3.*x* or Windows 95. These factors probably won't change the ultimate decision—only the degree of certainty that replacement is the best course of action.

To handle most Windows configurations with any comfort, 80MB is not enough storage; I'd want at least 200MB even for a portable installation. (It's hard to find a new notebook with a hard disk smaller than 340MB.) Upgrading your system to a new 210MB notebook hard disk will probably cost you at least $140, and you may well have to cope with a BIOS upgrade as well for the machine to recognize the new disk.

Your older computer probably has only 2MB or 4MB of memory, but for Windows you really need at least 8MB—and 16MB is much better. At today's prices, 4MB of memory will run about $200.

These two upgrades alone will cost at least $340. And investing that amount in a system that's probably worth less than $900 on the used-equipment market doesn't seem to make much sense. For about $1,200 you can get a used notebook with considerably more processing power, such as a 486DX2/50 system with 8MB and a 250MB hard disk. You'd probably do better to sell your old unit and invest in a "new" system. The net cost to you would be roughly equivalent to upgrading your old system, and you're likely to end up with a better machine.

You also don't specify which 486 processor your notebook uses, but the processor may be one of the non-Intel CPU chips that has a 16-bit system data bus instead of the wider 32-bit system bus used by all the Intel 80486–family chips. If this is the case, your performance is even further restricted and stepping up to a "true" 486 will give you far better performance—necessary for any version of Windows, but especially for Windows 95.
—Alfred Poor

OPERATING ENVIRONMENTS

Choose Your OS

How can I decide whether to run my PC under DOS 6.1, Windows 3.1, or Windows 95? I'd like to be able to run all of my programs, and I'm afraid that many older DOS programs might not run under Windows 95.

JOSÈ RAFAEL CAPÛ,
Rio Piedras, Puerto Rico

PC MAGAZINE: You may be surprised at how many of your programs will run under Windows 95. For those DOS programs that really, really won't, you can usually run them "as if" under Windows 95 by adjusting the program's properties. Right-click on the program in Explorer or a folder window, select Properties from the menu, and click on the Program page. Press the Advanced button and check the box marked MS-DOS mode. Now when you run this program, Windows 95 will shut down temporarily, run the program as if under unadorned DOS, and then start up again.

Still, as long as you retain your old DOS and Windows rather than replacing them with Windows 95, you can always boot into them if necessary. In a Windows 95 DOS prompt, switch to the root directory of your boot drive and issue the command

```
ATTRIB -R -H -S MSDOS.SYS
```

Now edit this file. You'll see that its format is similar to that of a Windows .INI file. In the options section, set the BootMulti= key to 1 or add the line BootMulti=1 if this key is not present. Save the file, then issue the command

```
ATTRIB +R +H +S MSDOS.SYS
```

Restart your system, and when you see the message "Starting Windows 95..." on the screen, press F4 to boot into your previous DOS version. Then you can simply type WIN to run your previous version of Windows.
—Neil J. Rubenking

Partitioning Huge Hard Disks

Your tip of January 10, 1995 on partitioning hard disks suggested creating a number of partitions each less than 128MB. I just purchased a new computer with a 1GB drive, and it came formatted as one large partition. It doesn't seem reasonable to partition it into many 128MB partitions. That would create a lot of inconvenience in finding things where none exists now.

Is there any solution to this quandary in sight? It doesn't seem that Windows 95 will solve this problem, since it uses virtually the same file system. I could use disk compression, but I'm reluctant to slow down my new system and introduce another layer of unreliability. For now I guess I'll live with the waste of space, unless you have any suggestions.

MARK KATZ, *via ZD Net*

I recently received a new Pentium workstation with a 1GB hard disk. After transferring all files from my 486 with a 442MB and a 60MB disk (about 450MB of files), I found I had almost completely filled the 1GB disk. There seems to be significant overhead in storing files on the 1GB disk. Should I be buying more, smaller drives instead? What excuse do the hardware vendors give for this blatant "mis-design" apparently put in place to sell more drives to consumers?

DAVID D. RICHERT, *via the Internet*

PC MAGAZINE: This topic comes up again and again, because the limitations of the FAT (file allocation table) file system are so difficult to accept today. Hard disk space is allocated in units called clusters, and the number of clusters is limited to 64K. The cluster size effectively starts at 2K and just keeps doubling until the number of clusters required is less than 64K. Since the space used by every file must be rounded up to the nearest full cluster,

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5100e P100 8/1G	1,780.00	590 P90 16/1G	2,575.00
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AST

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the bigger the disk the more wasted space. The average wasted space is half a cluster per file. Windows 95's VFAT (Virtual FAT system has exactly the same limitation.

Don't blame the hardware manufacturers, though. If you take the same drive and format it for OS/2's HPFS (High Performance File System) or Windows NT's NTFS (NT file system), almost no disk space will be wasted. The problem is that you'll no longer be able to access that drive using DOS, Windows 3.*x*, or Windows 95. We're stuck with the FAT and VFAT file systems because we want backward compatibility.

These days 1GB drives are very common, and manufacturers always seem to format them as a single immense partition. Once they have preloaded software, changing the partition size becomes a major pain. If you're about to order up a new system with a large hard disk, consider asking the manufacturer to partition it before loading the software. A partition smaller than 128MB yields the smallest possible clusters, but dividing a 1GB drive into eight or more small partitions would indeed be crazy. Three partitions each less than 512MB would have clusters one-fourth the size of those on an unpartitioned 1GB drive.

Disk compression is also an option, as DriveSpace compressed drives effectively have a cluster size of 5K. DriveSpace has proved to be reliable over the years, and it's not necessarily a drag on system performance. The in-memory compression and decompression does take some time, but that is offset by a reduction in the amount of relatively slow disk access that's required. And as noted before, compressed drives have minimal wasted space. If you like, you can experiment with DriveSpace by compressing part of your hard disk and gradually expanding the compressed portion.—*Neil J. Rubenking*

32-bit File Access Prevents UNDELETE

I recently upgraded to Windows for Workgroups 3.11 and suddenly found that with 32-bit file access enabled, UNDELETE no longer works. When I try to UNDELETE a file I get the following message: "Interrupt 26 (Direct Sector Write) Blocked to Preserve Volume Integrity." When I disable 32-bit file access, UNDELETE works fine. Is there any way to get around this limitation?

WILLIAM HUDSON, *via ZD Net*

PC MAGAZINE: The line displayed above that error message provides the solution. It says "Exit Windows and run the MS-DOS version of this utility." As you note, 32-bit file access is not compatible with the UNDELETE command's "DOS mode," which requires low-level disk access. The other two modes, Delete Sentry and Delete Tracking, rely on a RAM-resident portion of UNDELETE to detect file deletion; this detection fails under 32-bit file access. UNDELETE and 32-bit file access simply do not go together. If you need to restore a deleted file, you'll have to exit Windows for Workgroups.

Windows 95 users enjoy built-in insurance against accidental file deletion. The default system behavior is to move a "deleted" file to the Recycle Bin. When the contents of the Recycle Bin on a given drive reach a user-definable portion of the drive's capacity (10 percent, by default), the oldest files are discarded. And of course the user can empty the Recycle Bin at any time. But as long as a file is still present in the bin, it can be restored.
—*Neil J. Rubenking*

WORD PROCESSING

Correcting AutoCorrect in Word

Microsoft Word's AutoCorrect feature can get tricky in certain situations. Suppose, for example, you want to correct "cd-rom's" to "CD-ROM's" automatically. If you try following the usual method, you may well decide that it can't be done.

By default, Word's AutoCorrect feature is set to change straight quotes to smart quotes, which means it also changes straight apostrophes to more eye-pleasing curly apostrophes. But this feature works only when you type within a document, which means it doesn't work when you type a word in the AutoCorrect dialog box. So if you add the AutoCorrect entry telling Word to replace "cd-rom's" with "CD-ROM's," Word will replace the lowercase version only if you enter it in the document with a straight up-and-down apostrophe. And that, of course, means it will ignore the word if you've typed it with the default setting that changes the apostrophe to the curly version.

Luckily, there's an easy way around the problem. If you type both the word you want changed and the word you want it changed to in the document, you can use Word's cut-and-paste commands to paste the curly apostrophe versions into the AutoCorrect dialog box. Simply cut or copy the words from the document and paste them into the Replace and With text boxes in the AutoCorrect dialog box, using Ctrl-V or Shift-Insert to paste. Word will then look for the curly apostrophe in "cd-rom's" and replace the word with "CD-ROM's," complete with a curly apostrophe.

SHANE DEVENSHIRE,
Walnut Creek, California

PC MAGAZINE: This approach is notably easier than Microsoft's recommended workaround. Before I get to that, though, let's start with a comment on terminology, just to avoid confusion.

One of the check boxes in the AutoCorrect dialog box is labeled Change 'Straight Quotes' to 'Smart Quotes.' But if you put a check in the box, what the feature actually does is change quotes that are straight up and down to quotes that are curly. The smart part of the smart quote feature is an algorithm that decides whether a given curly quote is an open quote or close quote. So although smart quotes are always curly quotes, curly quotes are not always smart. And it's best to talk about *curly quotes* or *curly apostrophes*, unless you're talking about the feature that actually chooses which curly quote to use.

Microsoft suggests entering the curly apostrophe into the AutoCorrect dialog box as an ANSI code, using the Alt key and the numeric keypad. The code for the character is 0146, so to enter the apostrophe in either the Replace or With text boxes, you would hold down the Alt key, type 0146 on the numeric keypad, and then release the Alt key. Pasting the entire word is not only easier, it saves you from having to look up or remember the ANSI code.

Whichever approach you like better, however, note that in Word 6 you have to apply it differently than you do in Word 7. Let's assume Word is set to change straight quotes to curly quotes. The Word 6 AutoCorrect feature looks at the word after it's been changed to a curly apostrophe; the Word 7 AutoCorrect feature doesn't. Instead, it looks at the word as you're actually typing it, using the straight apostrophe. In Word 6, then, you have to enter both the word to replace and the replacement word with curly apostrophes. But in Word 7, you have to enter the word to replace with a straight apostrophe and only the replacement word with the curly apostrophe.

To take fullest advantage of the copy-and-paste approach in Word 6, first type both the replacement word and the word to be replaced in your document, separated by a space. Then select the word to be replaced and choose Edit | Cut or a shortcut equivalent. Next, select the replacement word and, with the word still selected, choose Tools | AutoCorrect to open the AutoCorrect dialog box. Word will automatically enter the selected word in the With text box (the replacement word). You can simply use Ctrl-V or Shift-Insert to paste the word to be replaced in the Replace text box, then choose Add to add the entry to the AutoCorrect list.

To use this trick in Word 7, type only the replacement word in a document and select it. Then choose Tools | AutoCorrect. Here again, Word will enter the selected word in the With text box. You can type the word to replace in the Replace text box, using a straight apostrophe, and choose Add.

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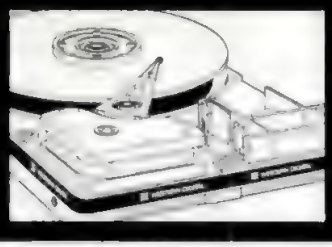

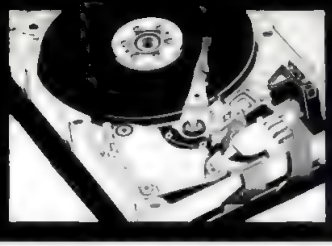

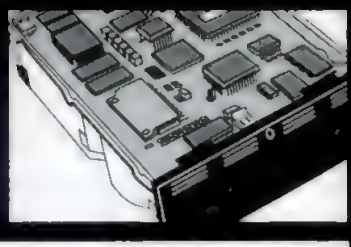

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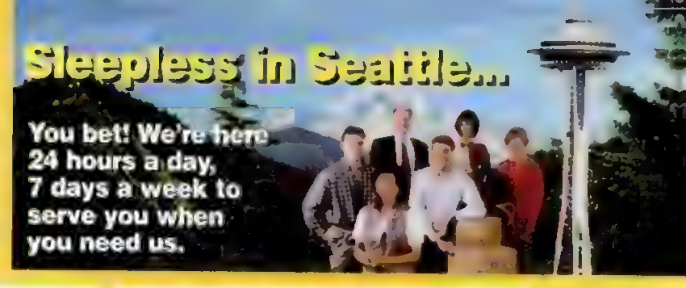

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Ironically, this difference between Word 6 and 7 gives Word 6 an advantage in smarts. If you turn the smart quotes feature on for some documents and off for others, you can enter two versions of any given AutoCorrect entry in Word 6: one that looks for the word with a straight apostrophe and corrects it complete with a straight apostrophe, and one that looks for the word with a curly apostrophe and corrects it with a curly apostrophe.

In Word 7, however, you can have only one entry. That entry must look for the word with a straight apostrophe and can correct it in only one way. If you sometimes use the smart-quote feature and sometimes turn it off, you'll want to enter the correction for the kind of apostrophe you use most often. But either way, you'll have to change the apostrophe back in one mode or the other after a word has been corrected.—*M. David Stone*

DATABASES

Auto-deleting Temporary Tables in Paradox

If you need to create temporary tables or other files during a Paradox for Windows session, here's an undocumented feature that may prove useful: Any file saved in your private directory whose filename begins with __ (two underscores) is automatically deleted when you exit Paradox. And these files don't show up in your project viewer—a boon for developers who don't want users accessing any "behind-the-scenes" stuff.

So, for example, if you need to run several queries and don't want to have to remember to delete the files when you're done with them, name them appropriately and Paradox will do it for you. Of course, if you decide you want to keep them, you'll need to rename the files before exiting.

BERNARD PEGIS,
Santa Paula, California

PC MAGAZINE: Paradox for Windows creates many temporary tables and files during a session. Some are automatically deleted when you leave Paradox; others stick around and are simply overwritten the next time you perform the same operation. Some of these temporary tables and files are created in your private directory using filenames that begin with a double underscore. These files are hidden from view, so they won't show up in the Project Viewer or in any Paradox dialog boxes. And because Paradox automatically deletes these files, you usually never see them.

Paradox doesn't maintain a list of these temporary double-underscore files so it can explicitly delete them. Instead it simply deletes all the files in the private directory that begin with a double underscore. So, be sure to avoid using filenames beginning with a double-underscore for any files you want to keep.

It might seem logical to use your knowledge of this behavior as part of an approach to creating and removing temporary tables or files in your applications. After all, it's tempting to simply place the temporary files in your private directory, give them filenames that start with a double underscore, and then let Paradox automatically delete them. There are two potential hazards, however.

First, you must be sure your filename does not conflict with one that Paradox uses. Because you can't know for certain which names Paradox uses, either write code to locate a filename that's not in use or choose a deliberately obscure filename and take your chances. Second, this technique relies on an essentially undocumented characteristic of Paradox for Windows that could change in a future release, and thus it should be avoided if possible. If you're building an application for use by others, the best approach is to avoid any lingering doubts about filename conflicts or undocumented features by explicitly deleting any temporary files you create in your application.

Save the double-underscore technique for storing a temporary, "just for this session" query result when you're casually browsing your own data. After executing a query, you can choose Table | Rename to rename the ANSWER.DB table that stores the query result to something that begins with a double underscore. (Paradox will warn you if a table with that name already exists.) When you exit Paradox, the file will automatically disappear.—*Sal Ricciardi*

Becoming an Access Programming Guru

Can you recommend some good advanced books for learning how to develop Microsoft Access applications?

HELEN AGEE,
Tarrytown, New York

PC MAGAZINE: The best book I've seen so far is *Microsoft Access 95 Developer's Handbook*, by Paul Litwin and Ken Getz. This well-written and comprehensive book consists of 24 chapters filled with expert advice and advanced techniques, and it comes with a CD full of useful code.

The authors obviously know Access inside and out, and they tackle some pretty difficult topics. For example, there are chapters on security and accessing DLLs and the Windows API, and there is code to handle some Windows 95–specific tasks like reading and writing to the Windows 95 Registry. There's also a helpful chapter on application optimization that shows you how to speed up your VBA code. As you may know if you've programmed both Access 2.0 and Access 95, the switch from Access Basic to Visual Basic for Applications in the Windows 95 release brings some fundamental differences with regard to code management. The authors do a good job of explaining the associated pitfalls and what you can do about them.

Chapters on using Access 95's improved OLE automation features, mastering multiuser and client/server programming, and creating Access 95 add-ons like builders, libraries, and wizards round out coverage of the usual topics like forms, reports, and printing. Access's newfound ability to keep two databases in sync is discussed in a chapter on mastering replication. You'll find lots of code and explanation throughout. This book is sure to help anyone who wants to program Access. For more information, contact Sybex at 800-227-2346 or 510-523-8233, or you can visit its Web site at *http://www.sybex.com*.

The Waite Group's *Microsoft Access 95 How-To*, also by Getz and Litwin, is another excellent choice. This book takes a practical approach by organizing the text as answers to a series of "How do I?" questions about programming Access. Its 12 chapters of questions and answers cover a broad range of Access developer topics, including programming your printer, making the most of the Windows API, and optimizing your application. Each question is accompanied by a thorough explanation of the technique and code used to solve the problem. The book comes with a CD containing all the sample code, data, and so on used in the book. For more information, contact The Waite Group at 800-368-9369 or 415-924-2575 or visit the Web site at *http://www.waite.com/waite*.—*Sal Ricciardi*

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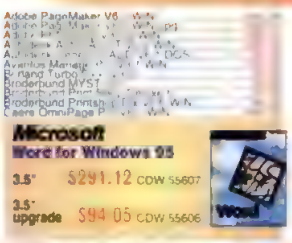

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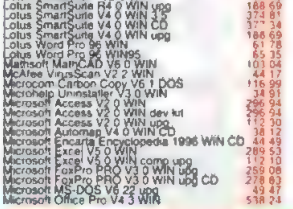

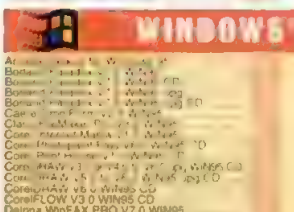

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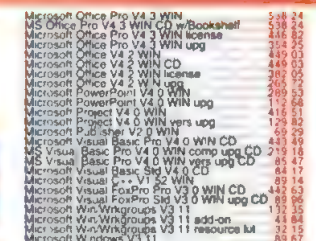

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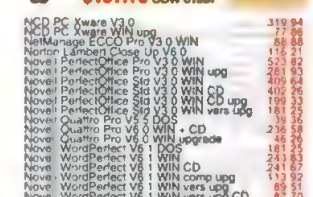

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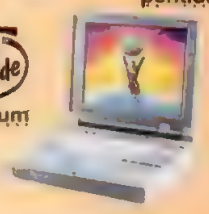

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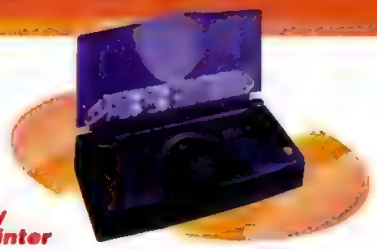

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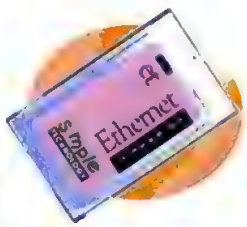

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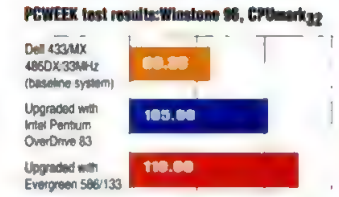

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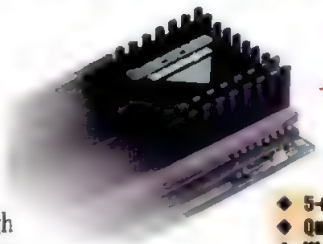

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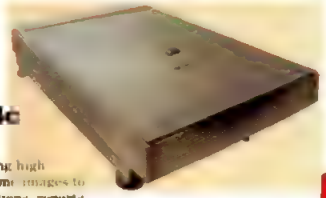

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NEC 6Xi	[illegible]
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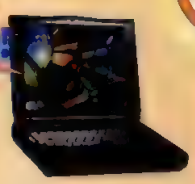

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Presario CDS774 CDS972 CDS982, CDTV975, CDS974 (in pairs)	4/8/16/32Meg	89/171/334/669
CDS982, 7152, 7170, 7180, 9545, 9546, 9564		
Prolinea 4/25S 4/33S 4/50 4/50d 4/66	1/2/4/8Meg	59/89/169/339
Prolinea MT 5100 4/50 466 Expansion 4/50S 4/66S 466 466	4/8/16/32Meg	169/289/569/1099
Prolinea [illegible] 4100 575 580 5120 575 580 5120 [illegible] 5100 mm 5133 mm	4/8/16/32Meg	109/209/349/699
Prolient 1500 575 5100 1500R 575 5180 (install in pairs)	4/8/16/32Meg	89/171/334/669
Prosignia 300 575 580 500 5/60 500 5120 (tested in pairs)	4/8/16/32Meg	89/171/334/669
Prolient 1000 5/60 Prosignia 5/60 (install in pairs)	8/16/32/64/128	171/334/669/1309/2609
Prolient 2000 486/50 5/66 5/90 7000R 5/66 5/90 (install in pairs)	8/16/32/64/128	171/334/669/1309/2609
4000 4/66 5/66 5/90 5180 7000R 5/66 5/90 5/100 4500 5/100 4500R 5/100		

COMPAQ LAPTOPS & NOTEBOOKS

Elite 5000	4Meg [illegible]	2MB/32MB/128MB	269/529/1281/2623
LTE 386S/20	4Meg Module	1211125-002	179.00
LTE, TE 20 25 25C	4Meg Module	1257B9-002	179.00
LTE, TE 20 25 25C	8Meg Module	1257B8-003	319.00
LTE LTE/20 25 25C	16Meg Module	1257B9-004	589.00
LTE LITE 425C/33C/25E/25L	4Meg Module	1422337-002	149.00
LTE LITE 425C/33C/25E/25L	8Meg Module	1422337-003	269.00
LTE LITE 425C/33C/25E/25L	16Meg Module	1422337-004	549.00
SLT 286	4Meg Module	1102237-001	149.00
SLT 286	8Meg Module	1102B36-001	269.00
SLT 286	4Meg Module	1103D05-001	169.00
Concerto, LTE Elite	4Meg	1447B0-001	139.00
	8Meg	1447B0-002	269.00
	16Meg	1447B0-003	534.00
Contura 320, 325	2Meg	1394B7-001	89.00
	4Meg	1394B8-001	179.00
	8Meg	1394B9-001	269.00
Contura 400, 410	4Meg/8Meg/16Meg		139/269/529
Contura 420, 420C, 425CX	4Meg/8Meg/16Meg		139/269/529/788
	4Meg	1446B2-001	139.00
	8Meg	1446B1-001	269.00
	16Meg	1446B3-001	534.00
	4Meg	1446B2-001	139.00
	8Meg	1446B1-001	269.00
Aero 4/25, 4/33	4Meg	1460S2-001	139.00
	8Meg	1460S1-001	269.00

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1.6 GIG —	319	1.6 GIG —	399	1.6 GIG AC31600	349

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S RAM Cards 2MEG	199	Audio Card	199
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14.4/9.6/4.8/2.4 Data/Fax Modem	149	Panasonic 6XL D720 port CDRom player	279
Reader/writer Card (15A Slot)	149	Type III 170 Mg Hard Drive	339
Lan Ethernet (Coax) (10 Base T)	99	Type III 250 Mg Hard Drive	419
Portable CD ROM (4x) & Card	299	Type III 340 Mg Hard Drive	523
		Xircom Combo Ethernet + Modem = 28.8 Adapter	549

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TOSHIBA LAPTOP MEMORY

MODEL	AMT UPGRADED	MANUAL PART #	PRICE
T2000SX/T2000SX/T1900 1MB C	2Meg/4Meg/6Meg	PX-PA2896U	69/169/319
T2100, 2105, 2150, 2155, 3110, 3150	4Meg/8Meg/16Meg/24 Meg		104/209/399/599
T4400SX, S3C T6400, T6400	4Meg	PX-PA2094U	169.00
T4400SX, S3C T6400, T6400	8Meg	PX-PA2095U	375.00
T4400SX, S3C T6400, T6400	16Meg	PX-PA2010U	699.00
T4500, C T4600, T4700, T1900, C T1910, T1950 (3.3 v)	4Meg	PC-PA2012U	167.00
T4500 C T4600 T4700 T1900, C T1910, T1950 (3.3 v)	8Meg	PC-PA2013U	299.00
T4500, C T4600 T4700, T1900, C T1910, T1950 (3.3 v)	16Meg	PC-PA2014U	599.00
T4700, 4800, 4850 (Hard Drive)	32Meg/710Meg/1.3 Gig		739/969/1119
T3400CT, T2480 T3500	4Meg/8Meg/16Meg	PC-PA2979U	179/349/619
T3400CT	32Meg		1549.00
T3100SX, T3200SX	2Meg	PC15-PA8208U	109.00
T3100SX, T3200SX	4Meg	PC15-PA8210U	149.00
T800, 610, C1	8Meg/16Meg/32Meg		299/585/1159
T700	8Meg/16Meg/32Meg		349/649/1299
T400CS, 400CD7	8Meg/16Meg/32Meg		299/585/1159

NOTEBOOK, LAPTOP MEMORY

MODEL	AMT UPGRADED	MANUF. PART #	PRICE
ACER 730, 735C, 740, 780	4Meg/8Meg/16Meg		89/169/349
ACER 760, 765, 780, 784, 786, 787,	4Meg/8Meg/16Meg		139/269/534
ACER 780	4Meg/8Meg/16Meg		139/269/534
ACER Note Pro, ACER Note Lite	4Meg/8Meg/16Meg		139/269/534
AST Ascentia 900N, 950N	4Meg/8Meg/16Meg		139/269/534
AST Ascentia 950	4Meg/8Meg/16Meg		269/534
AST Bravo & 4/25SXLT	4Meg/8Meg/16Meg	80T1535-001, -002	139/269/534
AST Notebook Pros [illegible]	4Meg/8Meg/16Meg	500014-002	139/269/534
AST Power Exec 2/25C, 4/25SL, 4/33SL	4Meg/8Meg/16Meg	80T1535-001, -002	139/269/534
AST Power Exec 2/25C	4Meg/8Meg/16Meg		139/269/534
AST Power Exec 4/33C	4Meg/8Meg/16Meg		139/269/534
AT&T Globalyst 130 (Call for other Globalyst)	4Meg/8Meg/16Meg		139/269/534
AT&T Globalyst 286	4Meg/8Meg/16Meg		139/269/534
AT&T Safari NSX/20	4Meg/8Meg/16Meg	PEC 37051	219.00
Austin DX4, D82, SX2 SX Series	4Meg/8Meg/16Meg		139/329
Bondwell B310 Plus	1Meg	23000-00100	79.00
Bondwell B310V SX	1Meg		209
Canon Innovia Book 150	4Meg/8Meg		139.00
Canon Innovia Book 200LS	4Meg/8Meg/16Meg		139/269/529
Canon Innovia 486	2Meg/4Meg/8Meg		69/139/289
Canon Innovia 486-10	4Meg/8Meg/16Meg		139.00
Canon Notepad 486	4Meg/8Meg/16Meg		139.00
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Dell [illegible] LX 425C, 425CD, 425CP 410DD	4Meg/8Meg/16Meg		139/269/549
Dell [illegible] 425C, 425CD, 425CP	4Meg/8Meg/16Meg		139/269/549
Dell [illegible] 1100, 4100CX	4Meg/8Meg/16Meg		139/269/549
Dell [illegible] 425C, 433CX, 450, 466CX	4 Meg/16 Meg		139/549
Epson Actionnote 880c, 880cc, 980cs	4Meg/8Meg/16Meg		139/269/549
Epson Actionnote 770, 700cs	4Meg/8Meg/16Meg		139/269/549
Epson Actionnote 800, 850, 8650	4Meg/8Meg/16Meg		139/269/549
Epson Actionnote 990	4Meg/8Meg/16Meg		139/269/549
Epson Actionnote 4000 Motherboard	4Meg/8Meg/16Meg		229
Epson Actionnote 4LC/20, 4LC/33, 4DLC2-66	4Meg/8Meg/16Meg		229
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HP Omnibook 530, 600	4Meg/8Meg/16Meg		139/269/549
HP Omnibook 4000	4Meg/8Meg/16Meg		139/269/549
HP Omnibook 5000	8Meg/16Meg/32Meg		269/549/1199
Leading Edge Series 2000	4Meg/8Meg/16Meg		139/549
Lasmark SE10	4Meg		179/319
Magnavox Metalite	1Meg	286, 386SX	89/139
Midwest Micro Elite SX 25, SX33, DX2-50, DX2-66	4Meg/8Meg/16Meg		149/289/549
Midwest Micro Elite DX2 DX2-66, 80A 25, 20A-100	4Meg/8Meg/16Meg		149/289/549
Midwest Micro Elite Solo Plus DS-75, DS-80	4Meg/8Meg/16Meg		149/289/549
NCR Safari 3100, 3181	4Meg/8Meg/16Meg		139/269/549
NEC Ultralite Versa E, V, MP	4 Meg/8Meg/16Meg/24Meg	OP4104	149/319/579/999
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NEC versa 4000C	4/8/16/32Meg		139/269/549/1199
Packard Bell 386SX, 286	1Meg/4Meg	286, 386SX	109/179
Packard Bell Statesman	2Meg/4Meg		99/209
Panasonic CF-25, CF-27	4Meg	CF-BA165	89.00
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Sharp 6781, 6881, 6785, 6788, 6885, 6761	2Meg		89.00
Sharp 8150, 8650, 8660, 7760, 7780	4Meg/8Meg/16Meg		139/269
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Sharp PC310, PC320, 3910 & 3950	4Meg/8Meg/16Meg		139/269/549
TI Travelmate 2000	2Meg	2340024-0001	79.00
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Canon, BP 430	–	–	–	–	–	–	99	–	–	–	–	–
Canon, BP 860	–	–	69	–	–	–	–	–	149	399	699	–
Canon, LBP4, 4 Jet, 4Mx	–	–	129	179	–	–	–	–	–	–	–	–
Epson EPL 4000 Action Laser	–	–	–	–	–	–	229	–	–	–	–	–
Epson Action Laser 1100, 1600	–	–	69	79	–	–	99	–	199	399	–	–
Epson Action Laser	–	–	74	–	173	–	–	272	–	–	–	–
Epson 8000, 8000 Plus	–	–	89	179	–	–	279	–	Call	Call	Call	Call
Epson 1000, 1000, 8000, 8000	–	–	–	–	–	–	–	–	–	–	–	–
HP 2 20-	–	–	–	–	–	–	299	–	–	–	–	–
HP 3, 3D, 3P, 3P, 3P+	–	–	99	–	–	–	199	–	299	–	–	–
HP 4, 4M, 4Si, 4Si MX	–	–	59	–	–	–	169	–	269	–	–	–
HP 4P, 4PLUS, 4MPlus 1600, 1600CM	–	–	–	–	–	–	299	–	399	–	–	–
HP 4L	–	–	99	–	–	–	199	–	–	–	–	–
HP 2Si	–	–	69	–	–	–	169	–	269	–	–	–
HP 4Si	–	–	89	–	–	–	189	–	289	–	–	–
HP 5P	–	–	69	–	–	–	169	–	269	–	–	–
HP 5Si	–	–	89	–	–	–	189	–	289	–	–	–
HP Design Jet 600, 650, 200	–	–	69	–	–	–	169	–	269	–	–	–
HP Deskjet 500, 500C, 510, 550, 560	49	–	–	–	–	–	–	–	–	–	–	–
HP Deskjet 1200C, 1200C/P	–	–	99	–	–	–	199	–	299	–	–	–
HP Pentfet XL300	54	–	–	–	–	–	154	–	299	399	–	–
IBM Laser 4019, 4019E	–	–	–	–	139	–	–	–	–	–	–	–
IBM Laser 4029, 4037	–	–	–	–	–	–	139	–	–	–	–	–
IBM Laser 4039, 4079	–	–	69	–	–	–	139	–	299	–	–	–
Kodica LP 3110	–	119	169	239	–	–	–	–	–	–	–	–
Lasmark Optra L, LX, R, RX	–	–	89	–	–	–	189	–	171	334	699	–
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Lasmark Valuewriter 200, 400, 600	–	–	69	–	–	–	169	–	–	–	–	–
NEC 90, 290	–	–	119	–	–	–	–	–	–	–	–	–
NEC 95, 97	–	–	79	–	–	–	–	–	–	–	–	–
Qic 400	–	–	79	–	–	–	–	–	–	–	–	–
Qic 400E, 400EX, 410E, 410EX	–	–	89	129	349	–	219	–	–	–	–	–
Qic 830, 840	–	–	–	139	–	–	–	–	–	–	–	–
Packard Bell PB 9000	–	–	–	139	–	–	–	–	–	–	–	–
Packard Bell 9010	–	–	–	139	–	–	227	–	–	–	–	–
Panasonic 4420/4450I	–	–	–	139	–	–	229	–	–	–	–	–
Panasonic 4410/4430	–	–	–	119	–	–	179	–	–	–	–	–
Panasonic 4455	–	99	–	–	–	–	–	–	–	–	–	–
Panasonic 4400/5400	–	89	129	–	–	–	229	–	–	–	–	–
Panasonic 4440 5410 8660	–	89	129	–	–	–	229	–	–	–	–	–
Sharp 9400, 9460, 9600, 9700	–	89	119	–	–	–	229	–	–	–	–	–
Sharp 9500 E, H, 9700 H	–	79	–	–	–	–	209	–	–	–	–	–
TI XL 9517/9536	–	–	69	–	–	–	–	–	–	–	–	–
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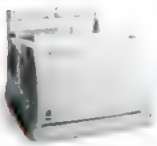

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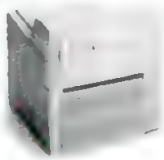

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Pentium 90MHz 8/1.2 SD1743-4D1	3,225.99
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Pentium 120MHz 8/1.2 SD1897-4D1	3,449.99

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Pentium 100MHz 8/800 SD1898-3D1	3,355.99
Pentium 100MHz 8/1.2 SD1898-4D1	3,835.99
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Pentium 133MHz 8/1.2 SD1897-4D1	4,795.99

Texas Instruments Extensa

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Toshiba 410 32MB KTT610/32	1,479.99
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TI TravelMate 16MB KTZ77786	670.99
TI Extensa 550 560 8MB KTI560/8	306.99
TI Extensa 550 560 16MB KTI550/16	612.99
TI Extensa 550 560 32MB KTI560/32	1,199.99
IBM 760 8MB KTM760/8	350.99
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IBM 365 4MB KTM365/4	185.99
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IDE Hard Drives

Capacity**	Model	Access	Cache	RPM	Form/ Height	Interface	Product Code	Bare Kit
WESTERN DIGITAL								
850MB	Caviar	10ms	64	4,500	3.5" 1"H	Enhanced IDE	WD285ØA	$199.99
1080MB	Caviar	10ms	128	5,200	3.5" 1"H	Enhanced IDE	WD21ØØØA	209.99
1280MB	Caviar	10ms	128	5,200	3.5" 1"H	Enhanced IDE	WD212ØØA	219.99
1620MB	Caviar	10ms	128	5,200	3.5" HH	Enhanced IDE	WD316ØØA	269.99
2113MB	Caviar	10ms	128	5,200	3.5" HH	Enhanced IDE	WD321ØØA	329.99
2559MB	Caviar	10ms	128	5,200	3.5" HH	Enhanced IDE	WD325ØØA	399.99
Seagate								
Mobile Products								
810MB	Marathon	16ms	120	4,500	2.5" 19.15m	2.5" Fast ATA-2	ST9816AG	$399.99
Desktop PC Products								
541MB	Cabo 541	14ms	32	3,600	3.5" 1"H	Fast ATA-2	ST3541A	$179.99
631MB	Medalist XE	14ms	120	3,811	3.5" 1"H	Fast ATA	ST3630A	179.99
850MB	Cabo 850	14ms	32	3,600	3.5" 1"H	Fast ATA-2	ST31276A	229.99
1276MB	Cabo 1276	12.5ms	64	4,500	3.5" 1"H	Fast ATA-2	ST31621A	279.99
1621MB	Cabo 1621	14ms	64	3,600	3.5" .75"H	Fast ATA-2	ST51270A	235.99
2113MB	Medalist	10.5ms	128	5,400	3.5" 1"H	Fast ATA-2	ST32140A	329.99
In Touch with Tomorrow								
TOSHIBA								
2.5" Drives								
810MB		13ms	128	4,200	2.5" 12.7m	IDE	MK1926FCV	$449.99
1300MB		13ms	128	4,200	2.5" 12.7m	IDE	MK13Ø1MAV	699.99
1300MB		13ms	128	4,200	2.5" 19m	IDE	MK2720FC	599.99
2100MB		13ms	128	4,200	2.5" 19m	IDE	MK21Ø1MAN	*CALL*
FUJITSU								
1090MB		12ms	64	4,500	3.5" 1"H	Fast ATA-2	FJ1614A	$209.99
Quantum								
850MB	Trailblazer	14ms	128	4,500	3.5" 1"H	Fast ATA-2	QUTR85ØA	$209.99
1280MB	Fireball	12ms	128	5,400	3.5" 1"H	Fast ATA-2	QUFB128ØA	239.99
1708MB	Sirocco	11ms	128	4,500	3.5" 1"H	Fast ATA-2	QUSR17Ø8A	319.99
2550MB	Sirocco	11ms	128	5,400	3.5" 1"H	Fast ATA-2	QUSR255ØA	429.99
Maxtor								
1336MB	Durango	11ms	128	4,500	3.5" 1"H	Enhanced IDE	MX71336A	$239.99
1670MB	Durango	11ms	128	4,500	3.5" 1"H	Enhanced IDE	MX71628A	279.99
2004MB	Durango	11ms	128	4,500	3.5" 1"H	Enhanced IDE	MX72ØØ4A	329.99
[redacted]								
1060MB	Deskstar	10.5ms	512	5,400	3.5" 1"H	Fast ATA-2	IB94G3186	$269.99
1700MB	Deskstar	12ms	128	4,500	3.5" 1"H	Fast ATA-2	IBØ6H8724	329.99

**Capacities based upon manufacturer's quoted capacity where 1MB = 1,048,756 bytes

SCSI Hard Drives

Capacity**	Model	Access	Cache	RPM	Form/ Height	Interface	Product Code	Bare Kit
Seagate								
Desktop PC Products								
1080MB	Medalist SL	12.5ms	128	5,400	3.5" .75"H	Fast SCSI-2 A/V	ST51Ø8ØN	$249.99
Workstation/Server Products								
2147MB	Barracuda 2LP	8ms	512	7,200	3.5" 1"H	Fast SCSI-2 A/V	ST3255ØN	$739.99
2147MB	Barracuda 2LP	8ms	512	7,200	3.5" 1"H	Fast Wide SCSI-2 A/V	ST3255ØW	779.99
2147MB	Barracuda 2LP	8ms	512	7,200	3.5" 1"H	Ultra SCSI-2 A/V	ST32171N	*CALL*
2147MB	Barracuda 2LP	8ms	512	7,200	3.5" 1"H	Ultra Wide SCSI A/V	ST32171W	*CALL*
4294MB	Barracuda 4	8ms	1,024	7,200	3.5" HH	Fast SCSI-2 A/V	ST1515ØN	1,099.99
4294MB	Barracuda 4	8ms	1,024	7,200	3.5" HH	Fast Wide SCSI A/V	ST1515ØW	1,129.99
4294MB	Barracuda 4LP	8ms	1,024	7,200	3.5" 1"H	Ultra SCSI-2 A/V	ST34371N	*CALL*
4294MB	Barracuda 4LP	8ms	1,024	7,200	3.5" 1"H	Ultra Wide SCSI-2 A/V	ST34371W	*CALL*
9090MB	Elite 9	11ms	1,024	5,400	5.25" FH	Fast SCSI-2 A/V	ST41Ø8ØØN	1,999.99
9090MB	Elite 9	11ms	1,024	5,400	5.25" FH	Fast Wide SCSI A/V	ST41Ø8ØØW	2,049.99
9090MB	Barracuda 9	8ms	1,024	7,200	3.5" HH	Ultra SCSI-2 A/V	ST19171N	*CALL*
9090MB	Barracuda 9	8ms	1,024	7,200	3.5" HH	Ultra Wide SCSI-2 A/V	ST19171W	*CALL*
FUJITSU								
2100MB	Allegro	8.9ms	512	7,200	3.5" HH	Fast SCSI-2 A/V	FJ2915S	$659.99
4200MB	Allegro	8.9ms	512	7,200	3.5" HH	Fast SCSI-2 A/V	FJ2934S	959.99
68 Pin Wide SCSI Drives								
2100MB	Allegro	8.9ms	512	7,200	3.5" HH	Fast Wide SCSI-2 A/V	FJ2915W	$659.99
MICROPOLIS								
2100MB	Taurus	8.5ms	512	7,200	3.5" 1"H	Fast SCSI-2	MC4221S	$659.99
4300MB	Capricorn	8.5ms	512	7,200	3.5" HH	Fast SCSI-2	MC3243S	1,029.99
9100MB	Scorpio	12ms	512	5,400	5.25" FH	Fast SCSI-2	MC1991	1,999.99
AV Gold Series Drives								
2100MB	Taurus	8.5ms	512	7,200	3.5" 1"H	Fast SCSI-2 A/V	MC4221AV	$759.99
4300MB	Capricorn	8.5ms	512	7,200	3.5" HH	Fast SCSI-2 A/V	MC3243AV	1,139.99
9100MB	Scorpio	12ms	512	5,400	5.25" FH	Fast SCSI-2 A/V	MC1991AV	2,139.99
68 Pin Wide Drives								
2100MB	Taurus	8.5ms	512	7,200	3.5" 1"H	Fast Wide SCSI-2 A/V	MC4221AVW	$899.99
4300MB	Capricorn	8.5ms	512	7,200	3.5" HH	Fast Wide SCSI-2 A/V	MC3243AVW	1,249.99
9100MB	Scorpio	12ms	512	5,400	5.25" FH	Fast Wide SCSI-2 A/V	MC1991AVW	2,229.99
Quantum								
1080MB	Fireball	12ms	128	5,400	3.5" 1"H	Fast SCSI-2	QUFB1Ø8ØS	$269.99
1280MB	Fireball	11ms	128	5,400	3.5" 1"H	Fast SCSI-2	QUFB128ØS	319.99
2150MB	Atlas	8ms	1,024	7,200	3.5" 1"H	Fast SCSI-2	QUXP3125S	679.99
2150MB	Atlas	8ms	1,024	7,200	3.5" 1"H	Fast Wide SCSI-2	QUXP3125W	729.99
4300MB	Atlas	8ms	1,024	7,200	3.5" HH	Fast SCSI-2	QUXP343ØS	999.99
[redacted]								
2100MB	Ultrastar	7.5ms	512	7,200	3.5" 1"H	Fast SCSI-2	IB94G3Ø54	$1,049.99
4500MB	Ultrastar/XP	8ms	512	7,200	3.5" HH	Fast SCSI-2	IB94G3196	1,499.99
5310MB	Ultrastar	8ms	512	5,400	3.5" HH	Fast SCSI-2	IB94G3787	1,399.99
68 Pin Wide SCSI Drives								
2100MB	Ultrastar	7.5ms	512	7,200	3.5" 1"H	Fast Wide SCSI-2	IB94G3Ø55	$1,049.99
4500MB	Ultrastar/XP	8ms	512	7,200	3.5" HH	Fast Wide SCSI-2	IB94G3Ø57	1,399.99
5310MB	Ultrastar	8ms	512	5,400	3.5" HH	Fast Wide SCSI-2	IB94G3Ø59	1,449.99

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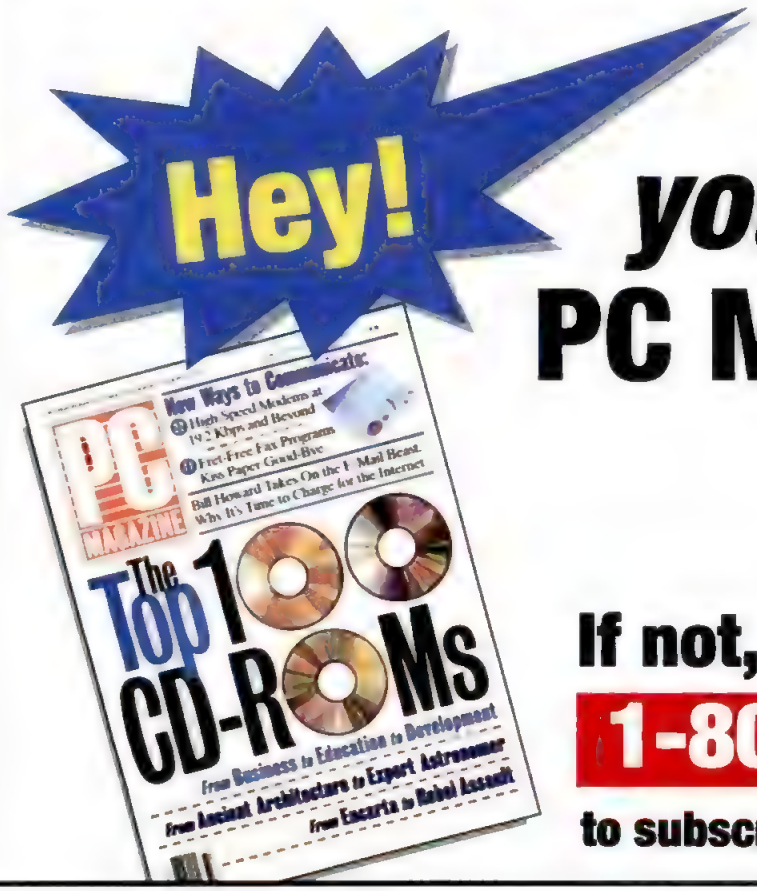

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AST Ascentia P

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- Standard SmartBay – swap 4X CD-ROM, 3.5" floppy or optional 2nd battery
- 11.3" Dual Scan & Active display with 800x600 resolutions
- 800MB & 1.2GB removable hard drives
- Built-in Soundblaster 16 Vibra chipset

Processor	Screen	RAM/HD	Price
Pentium 100	11.3" Dual Scan SVGA	8/800MB	$3300
Pentium 100	11.3" Dual Scan SVGA	8MB/1.2GB	3780
Pentium 133	11.3" Active SVGA	8/800MB	4250
Pentium 133	11.3" Active SVGA	8MB/1.2GB	4730

AST Ascentia J

- Integrated 14.4/14.4 Data/fax modem
- PCI bus architecture with 256KB L2 cache memory
- 10.4" SVGA (800x600) resolution Dual Scan and Active display

Processor	Screen	RAM/HD	Price
Pentium 75	10.4" Dual Scan SVGA	8/500MB	$2450
Pentium 100	10.4" Dual Scan SVGA	8/800MB	2840
Pentium 100	10.4" Active Matrix SVGA	8/800MB	3120

SHARP

FREE Preloaded software

- Dos 7.0
- Windows 95
- SuperVoice (PC-3060 only)
- Presentation F/X
- Power TransXit
- America Online
- Compuserve

Sharp PC-3000 Series

- GlidePoint™ pointer – the latest technology, the easiest to use
- Built-in infrared for wireless communications
- 32-bit VESA Local bus graphics
- Built-in 16-bit SoundBlaster compatible sound, microphone & 2 speakers (PC-3060 & PC-3070 only)
- Built-in 14.4Kbps voice/data/fax modem (PC-3060 only)

NEW MODELS! Call for details and pricing

Processor	Screen	RAM/HD	Price
5x86 100MHz	10.4" Dual Scan	8/515MB	$1900
5x86 100MHz	10.4" Dual Scan	8/515MB	2200*
Pentium 75	11.3" Dual Scan SVGA	8/515MB	2099
Pentium 100	11.3" Dual Scan SVGA	8MB/1GB	2600*

*Model PC-3060 & PC-3070.

Includes built-in sound system & 14.4 voice/data/fax modem

PC-3020

TEXAS INSTRUMENTS

WIN95 INSTALLED

Extensa 560

Extensa 560CD/560CDT

- 75MHz Pentium w/PCI bus & 256KB cache
- Built-in 4X CD-ROM drive
- Built-in 16-bit sound, microphone & speaker
- Integrated Touchpad pointer
- 10.4" Active Matrix & 10.4" Dual Scan
- Built-in infrared for wireless communications

Processor	Screen	RAM/HD	Price
Pentium 75	10.4" Dual Scan	810MB	$2749
Pentium 75	10.4" Active	1.2GB	3699

TravelMate 5130/5270/5300

Processor	Screen	RAM/HD	Price
Pentium 90	10.4" Active SVGA	8MB/1.2GB	$3699*
Pentium 120	11.3" Active SVGA	8MB/1.2GB	4700*
Pentium 133	11.3" Active SVGA	8MB/1.2GB	5390*

*SVGA-800 x 600 resolution

WIN95 INSTALLED NEW MODEL!

IBM®

WIN95 INSTALLED

intel inside

PC 300® Series

- Powerful Pentium processors – 75MHz, 90MHz, 100MHz, 133MHz, 166MHz
- Accelerated 64-bit PCI Local bus graphics
- PCMCIA drive bay available
- Multiple chassis sizes to get the expansion you need – slimline or desktop
- Support for up to 4 IDE devices
- 3-year warranty with Online Housecall – remote problem resolution

PC 700 Series Also Available!

RAM/HD	Slots/Bays	Price
8/540MB	3/3	$1495
16/850MB	5/5	1955
16/850MB	5/5	2013
16/No HD	5/5	2185
16/1.2GB	5/5	2444

Monitors priced separately

Pentium 166MHz models also available Call for details

IBM PC 300

Monitors priced separately

COMPAQ

CHOOSE YOUR O/S Windows 3.1 OR Windows 95

ProLinea

Monitors priced separately

Compaq ProLinea Desktops

- Blazing Pentium speed - up to 133MHz Pentium
- BIG hard drives – up to 1GB
- PCI Local bus – high-speed graphics
- PCI IDE controller – fast disk performance
- Multiple chassis sizes – get the expansion you need
- Compaq, 3-year worldwide warranty w/ 1st year on-site

Processor	RAM/HD	Slots/Bays	Price
Pentium 75	8MB/630MB	3/3	$1329
Pentium 75	16MB/1GB	5/5	1939
Pentium 90	8MB/630MB	4/4	1549
Pentium 90	16MB/1GB	4/4	1969
Pentium 100	8MB/630MB	3/3	1449
Pentium 100	8MB/1GB	3/3	1569
Pentium 100	16MB/1GB	5/5	2019
Pentium 133	16MB/1GB	5/5	2299

Monitors priced separately

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High-Fidelity JBL Speakers

Monitors priced separately **Digital Starion**

WIN95 INSTALLED

Digital Starion

NEW! Windows 95 Multimedia Computers

- 4X CD-ROM Drive
- Up to Pentium 166 – blazing speed!
- PCI local bus – high speed graphics
- Unbelievable sound – SoundBlaster Pro compatible SW Wavetable Premium JBL speaker system
- 28.8 fax modem and advanced telephony features (differs by model)
- Loads of **FREE** software preinstalled

Pentium 75	8MB/1.2GB	4X	$1599
Pentium 100	8MB/1.2GB	4X	1759
Pentium 100	16MB/1.6GB	4X	2099
Pentium 120	16MB/1.6GB	4X	2299
Pentium 133	16MB/1.6GB	4X	2499
Pentium 150	16MB/1.6GB	4X	2599
Pentium 166	16MB/1.6GB	4X	2799

Monitors priced separately

NEC

All NEW Models Optimized for WIN 95

NEC Ready Multimedia

WIN95 INSTALLED

Monitors priced separately

Ready Multimedia

NEW for Windows 95

- 6X CD-ROM drive*
- SoundBlaster compatible chip integrated on the system board
- 28.8 fax/modem, full-duplex speaker phone & answering machine
- Super fast 64-bit PCI Local bus graphics
- Built-in MPEG support for full screen, full motion video
- 32 bit PCI IDE controller – fast disk performance
- LOADS of **FREE** software

*4X CD-ROM on 75/100

Pentium 120	8MB/1.2GB	4X	$1799
Pentium 133	8MB/1.2GB	6X	1999
Pentium 150	8MB/1.2GB	6X	2299
Pentium 133	8MB/1.2GB	6X	CALL
Pentium 120	16MB/1.6GB	6X	2199
Pentium 133	16MB/1.6GB	6X	2499
Pentium 150	16MB/2GB	6X	2799
Pentium 166	16MB/2GB	6X	2999

Monitors priced separately

AST®

Authorized Reseller

150&166MHz PENTIUM

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Advantage Adventure Multimedia (6X CD-ROM)

- 6X CD-ROM Drive
- 6X CD-ROM Drive w/3disc CD changer (selected models)
- Advanced Telephony – 28.8 data/fax modem telephone answering system and speaker phone (differs by model call for details)
- Integrated 3-D surround sound (selected models)
- 64-Bit PCI Local bus graphics
- AST Works II navigation software – featuring SPOT
- Enhanced IDE interface-fast disk performance
- AST Lifeline technical support

All New Models!

Pentium 100	16MB/1.2GB	6X	$2020
Pentium 133	16MB/1.2GB	6X	2150
Pentium 150	16MB/1.6GB	6X	2370
Pentium 100	16MB/1.6GB	6X	2050
Pentium 133	16MB/1.6GB	6X	2300
Pentium 150	16MB/1.6GB	6X	2640
Pentium 166	16MB/1.6GB	6X	2830

* w/3disc CD changer

Monitors priced separately

WIN95 INSTALLED

Monitors priced separately

AST Advantage Adventure

HEWLETT® PACKARD

BIG SAVINGS ON HP PRINTER BUNDLES

HP LaserJet Printers

HP LaserJet 5P printer (IBM, 6ppm, 600dpi) C3150A	$ 879.99
HP LaserJet 5L printer (IBM, 4ppm, 600dpi) C3941A	479.00

HP InkJet Printers

HP DeskJet 340 printer (portable) C2655A	$ 289.99
HP DeskJet 340 CV (bundle) C2664A	329.99†
HP DeskJet 320 (bundle) C2637A#ABA	229.00†
HP DeskJet 600 printer C2184A	239.00
HP DeskJet 600C printer C4547A	259.00†
HP DeskJet 660C printer C2164A	359.00†
HP DeskJet 660Cse printer C4548A	369.00*†
HP DeskJet 855C printer C4551A	498.99*†
HP DeskJet 1600C printer C3540A	1349.99†

Home Office Products

HP OfficeJet LX C2891A	$ 689.99
HP FAX-700 C3530A	509.99

*Includes Family Font Package
† Includes HP Color Kit

Hewlett-Packard Scanners

HP ScanJet 4C scanner C2527B	$ 949.99
HP ScanJet 4S portable scanner C1127A	319.00

HP Tape Drives

HP T1000 (internal) C4320RB	$ 169.00
HP T1000e (portable) C4326RB	219.99
HP SureStore, 2GB, DAT, Int C1525F	939.99
HP SureStore, 4GB, DAT, Int C1526F	1079.99
HP SureStore, 8GB, DAT, Int C1528F	1329.00
HP SureStore, 8GB, DAT, Ext C1529F	1529.00

HP LaserJet 5L $479.00

PCM 5/96

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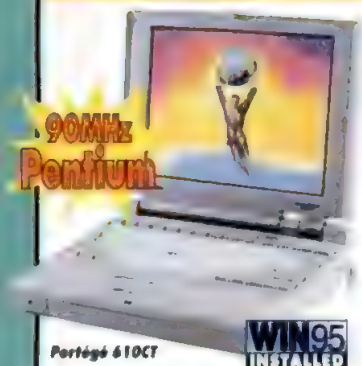


Portégé 610CT

Portégé 610CT

- Pentium 90MHz processor
- 9.5" True Color display for optimum color
- Built-in 16-bit sound (SoundBlaster Pro compatible), microphone & speaker
- Lithium Ion battery technology
- Integrated Accupoint for easy control

Processor	Screen	RAM/HD	Price
Pentium 90MHz	9.5" True Color	8/720MB	$3939

6X Speed!

Tecra 700 and 720

- PCI bus architecture (internal & external)
- 11.3", 800x600 high res. display (Tecra 700)
- 12.1" 1024x768 high res. display (Tecra 720)
- Built-in 28.8 fax modem with speaker phone (Tecra 720 model only)
- Built-in 6X CD-ROM Drive (Tecra 720)
- Optional 4X CD-ROM Drive (Tecra 700)

Processor	Screen	RAM/HD	Price
Pentium 120	11.3" Dual Scan SVGA	8MB/1.13GB	$4679
Pentium 120	11.3" Active SVGA	16MB/1.13GB	5949
Pentium 133	12.1" Active SVGA	16MB/1.2GB	7469

Tecra 720

WIN95 INSTALLED

Satellite Pro 410CT

Satellite Pro 410

- Built-in 4X CD-ROM Drive (Swap floppy & CD-ROM) (Active model only - optional on Dual Scan)
- Built-in 16-bit sound, microphone, speaker & MIDI
- EDO RAM memory, expandable to 96MB
- Built-in AC adapter - small, sleek design & reduced weight
- Integrated Accupoint - small, accurate & easy to use
- Lithium Ion battery technology
- Built-in infrared for wireless communications

Processor	Screen	RAM/HD	Price
Pentium 90	11.3" Dual Scan SVGA	8/772MB	$3199
Pentium 90	11.3" Active SVGA	8/772MB	4399

Satellite 2130CS/100CS

Satellite 2130CS/100CS

Processor	Screen	RAM/HD	Price
486DX4/75	10.4" Dual Scan	8/500MB	$1599
Pentium 75	10.4" Dual Scan	8/500MB	1969*

*EDO RAM

IBM®

ThinkPad® 760LD

ThinkPad® 760L and 760LD

- 10.4" Active display
- 32-bit accelerated Local bus video
- Built-in sound card, speakers & microphone
- 256KB Level 2 cache
- New tilting keyboard with palm rest

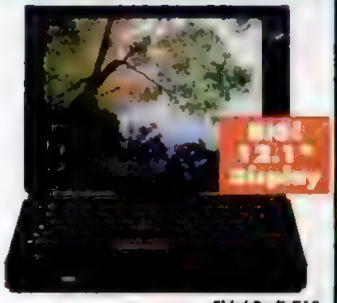
Processor	Screen	RAM/HD	Price
Pentium 90	10.4" Active	8/810MB	$4249
Pentium 90	10.4" Active	8/810MB	4549*

* Includes built-in 4X CD-ROM drive
Windows 95 models also available

ThinkPad® 760

- Up to 120MHz Pentium with 32-bit Local bus
- 12.1" Active display with 800x600 resolution (selected models)
- 4X CD-ROM Drive, MPEG-2 support, & full motion video (ThinkPad 760CD models only *)
- Built-in 28.8 fax modem
- SoundBlaster-compatible audio & telephony
- Lithium Ion battery technology

Processor	Screen	RAM/HD	Price
P90	10.4" Active SVGA	8/720MB	$4999
P90	12.1" Active SVGA	8/720MB	5499
P120	12.1" Active SVGA	8/720MB	5699
P120	12.1" Active SVGA	8MB/1.0GB	5999
P90	12.1" Active SVGA	8MB/1.2GB	6699*
P120	12.1" Active SVGA	8MB/1.2GB	6899*



ThinkPad® 760

*Features built-in 4X CD-ROM drive
WIN 95 models available. Call for details.

HEWLETT® PACKARD

HP OmniBook 600 NoteBook PC

HP OmniBook 600

- Weighs **ONLY 3.8 pounds!**
- Built-in 16-bit sound, microphone & speaker (Active model only)
- Built-in infrared for wireless communications
- Lithium Ion battery technology (Active model only)
- Instant "ON" recalls to work's state - lasts for months on a charge

Processor	Screen	RAM/HD	Price
486DX4/75	8.5" Dual Scan	8/340MB	$2200
486DX4/75	9.5" Active	8/340MB	2500

HP OmniBook 5500

- 133MHz Pentium with 32-bit PCI Local bus
- 12.1" Active Matrix display with 65,000 colors
- Super VGA 800x600 resolution on notebook
- PCI Local bus Video - 1.5MB video memory
- Instant "ON" capabilities
- Optional 4X CD-ROM available

Processor	Screen	RAM/HD	Price
Pentium 133	12.1" Active	8MB/1.35GB	CALL

HP OmniBook 5500 NoteBook PC

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Digital HiNote VP

NEW!

- Pentium processors with Mobile Triton PCI bus on all models
- EDO RAM memory for super-fast system performance
  Memory expansion up to 40MB (EDO memory on CTS5100 only*)
- Multi-level security and Win95 compatibility with Flash system BIOS
- 16-bit stereo sound with built-in speakers and microphone
- Ergonomic TouchPad pointing device and wrist rest

Processor	Screen	RAM/HD	Price
Pentium 100	10.4" Dual Scan	8/810MB	$2399
Pentium 100	10.4" Active	8/810MB*	2979

* Features EDO RAM memory

Digital HiNote VP Port Replicator

UP TO 100MHz PENTIUM with PCI BUS

- Network capable
- Built-in stereo speakers
- Built-in keyboard tilt stand
- MIDI and microphone port

HiNote VP

Digital HiNote Ultra II

- Up to 133MHz mobile Pentium processors
- 256KB of internal level 2 cache memory
- Oversized 10.4" Active displays
- 16MM trackball with sculpted palm rest

Processor	Screen	RAM/HD	Price
Pentium 100	10.4" Active SVGA	8MB/1.1GB	$3769
Pentium 120	10.4" Active SVGA	8MB/1.1GB	4059
Pentium 133	10.4" Active SVGA	8MB/1.4GB	4439

Digital HiNote Ultra II Expansion Options

- Multi-media module with 4X CD-ROM
- Port Replicator-Network capable
- Expansion dock with floppy disk & PCMCIA

Only 1.1" Thick! ONLY 4LBS.!

Light Weight Ultra Thin

UP TO 133MHz PENTIUM

WIN95 INSTALLED

HiNote Ultra II Shown with optional floppy dock

NEC

All NEW! Value Series

Versa 2205 $2499

Versa 550D $1799

NEC Versa 4000

NEC Versa 4000

- Built-in CD-ROM Drive* (Standard on some models, optional on others)
- Up to 120MHz Pentium processors
- 256KB Level 2 Cache to optimize performance
- Unbelievable display – 65K color Dual Scan, 16.8 million color Active (High resolution Active Matrix displays available – 800x600 resolution)
- Built-in 16-bit sound, microphone, MIDI and **2 built-in speakers**
- Multimedia docking station with outstanding Altec Lansing 4 speaker array (optional accessory, priced separately)

NEW Models with 4X CD-ROM

Processor	Screen	RAM/HD	Price
Pentium 75	10.1" Active	8/810MB	$3799*
Pentium 90	10.4" High Res.	8/810MB	4499
Pentium 90	10.1" Active	8/810MB	4499*
Pentium 120	10.4" High Res.	8MB/1GB	4999

* Features built-in 4X CD-ROM drive

COMPAQ

Contura 430

Processor	Screen	RAM/HD	Price
486DX4/100	10.4" Dual Scan	8/720MB	$2369
486DX4/100	10.4" Active	8/720MB	2939

LTE 5000 Series

- Up to 120MHz Pentium power w/PCI bus & 256KB cache
- 32-bit PCI Local bus graphics
- 8MB RAM exp. to 72MB
- Built-in 16-bit sound, microphone & **2 speakers**
- MultiBay – holds CD-ROM, 2nd HDD, floppy, or 2nd battery
- Up to 1.35GB hard drives (2.7GB max. capacity)
- Built-in infrared for wireless communications
- Supports NiMH batteries
- Optional MPEG and TV video adapter

WIN95 INSTALLED

Processor	Screen	RAM/HD	Price
Pentium 75	10.4" Dual Scan	8/510MB	$2830
Pentium 75	11.3" Dual Scan	8/810MB	3210
Pentium 75	10.4" Active	8/810MB	3590
Pentium 90	10.4" Active	8/810MB	3970
Pentium 90	10.4" Active	8/810MB	4340*
Pentium 120	10.4" Active	8MB/1.35GB	4720

* Features Built-in CD-ROM drive

UP TO 120MHz PENTIUM with PCI BUS

LTE 5000

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NEC READY 7612*
$1,999
OR LEASE
FROM $42/MONTH

- Intel Pentium® 133MHz
- 1.2GB IDE HDD
- 8MB RAM, expandable to 128MB
- 64-bit PCI local bus graphics controller
- 16-bit 3-D Surround Sound 7W Speakers
- 28.8Kbps fax/data modem, handsfree speakerphone
- Integrated 6X CD-ROM drive
- IrDA Infra-Red data transfer capability
- Microsoft® Windows® 95 & multimedia software suite
- Three-year limited warranty with first year on-site

MULTIMEDIA SHOWCASE*

NEC Ready Systems are perfect for your family or small office and offer the ultimate in multimedia features including: quad speed CD-ROM reader, 28.8 Kbps fax/modem, 64-bit PCI graphics, 16-bit stereo sound, speakerphone with voicemail and a multimedia software suite of over 20 titles.

Model	Processor	HD	Memory	Price
Ready 9616	Pentium 120MHz	1.0GB	16MB RAM	$2,199
Ready 7014	Pentium 150MHz	1.2GB	8MB RAM	$2,250
Ready 9617	Pentium 133MHz	1.6GB	16MB RAM	$2,399
Ready 9618	Pentium 150MHz	2.0GB	16MB RAM	$2,709
Ready 9619	Pentium 166MHz	2.0GB	16MB RAM	$2,999

THE ULTIMATE ENTERPRISE PC WORKSTATION*

NEC POWERMATE® PRO 166
$2,799
OR LEASE FROM
$76/MONTH

PowerMate Pro 166

- Minitower unit (MT-1850-2485SC)
- 166MHz Pentium® Pro Processor
- 2GB EIDE HDD
- 16MB RAM
- 6X CD-ROM Reader
- 32-bit sound

The perfect choice for corporate computing, NEC PowerMate Systems are some of the fastest most reliable systems available. Multimedia versions available with 6X speed CD-ROM readers and sound. Also available:

Model	Processor	HD	Memory	Price
PowerMate V466	Intel i486 DX2/66MHz	540MB	8MB RAM	$1,199
PowerMate V75	Pentium 75MHz	850MB	8MB RAM	$1,399
PowerMate V100	Pentium 100MHz	850MB	8MB RAM	$1,549
PowerMate P120	Pentium 120MHz	1.2GB	16MB RAM	$2,199
PowerMate P133	Pentium 133MHz	1.2GB	16MB RAM	$2,299
PowerMate P150	Pentium 150MHz	1.0GB	16MB RAM	$2,499

*Monitors not included in price.

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NEC VERSA 4000
$4,499
OR LEASE FROM
$123/MONTH

MULTIMEDIA TO GO

The new NEC Versa® 4000 brings you the next generation in notebook versatility with its innovative VersaBay II™ technology. You can configure it at a moment's notice with an optional CD-ROM reader, additional battery or hard drive.

NEC Versa 4000

- 8MB RAM standard (upgradeable to 40MB)
- Sound Blaster™ Pro Compatible 16-Bit Audio w/ Two Built-in Speakers
- Supports Full-Motion Video via Intel Indeo®
- Choice of Windows® for Workgroups 3.11 or Microsoft® Windows 95
- Removable Lithium Ion Battery
- 2 PC Card Slots
- VersaGlide™ Pointing Device with Palm Rest

Model	Processor	Screen	HD/CD-ROM	Price
PC-6100-11022D	Pentium 75MHz	10.1" TFT	810MB/4X	$3,799
PC-6110-11022D	Pentium 90MHz	10.1" TFT	810MB/4X	$4,499
PC-6110-7102	Pentium 90MHz	10.4" Hi-Res TFT	810MB RAM	$4,499
PC-6120-7702	Pentium 120MHz	10.4" Hi-Res	1GB	$4,999

A SMART VALUE FOR YOUR MONEY

The NEC Versa 2000's state-of-the-art intelligent design provides you with the best value in notebook computing.

NEC Versa 2000

- 75MHz DX4 Processor
- 2PC Card Slots
- Removable Lithium Ion Battery
- VersaGlide Pointing Device with Palm Rest

Model	Screen	HD/Memory/Modem	Price
PC-6300-4548	10.4" DSTN	540MB/8MB RAM	$1,799
PC-6010-1328W	9.5" TFT	350MB/4MB RAM	$2,299
PC-6010-1328MW	9.5" TFT	350MB/8MB RAM/14.4 Kbps	$2,599
PC-6010-1440MW	9.5" TFT	540MB/8MB RAM/14.4 Kbps	$2,999
PC-6020-1802W	9.5" TFT	810MB/8MB RAM/28.8 Kbps	$3,449
PC-6020-1802MX	9.5" TFT	810MB/8MB RAM/28.8 Kbps	$3,499

NEC MULTISPIN®: THE CUTTING EDGE IN CD-ROM READERS

Model	Data Transfer Rate	Access Time	Price
MultiSpin 6X (internal)	900 KB/sec	145ms	$349
MultiSpin 6Xe (external)	900 KB/sec	145ms	$469
MultiSpin 6V	900 KB/sec	145ms	$379
MultiSpin 4VIDE	600 KB/sec	200ms	$259
MultiSpin 4Xe 7 Disc Changer	600 KB/sec	350ms	$349
MultiSpin 4x4™ CD-ROM Changer	300KB/sec	380ms	$329

NEC MULTISYNC® MONITORS: A CLEAR ADVANTAGE AT WORK OR PLAY

Model	Screen	DPI	Max Resolution	Price
MultiSpin C400	14" diagonal CRT	.28mm	1024 x 768 NI	$ 299
MultiSpin M500	15" diagonal CRT	.28mm	1280 x 1024 NI	$ 599
MultiSpin XV15+	15" diagonal flat square CRT	.28mm	1280 x 1024 NI	$ 499
MultiSpin C500	15" diagonal CRT	.28mm	1024 x 768 NI	$ 399
MultiSpin XV17+	17" diagonal flat square CRT	.28mm	1280 x 1024 NI	$ 819
MultiSpin XE21	21" diagonal flat square CRT	.28mm	1024 x 768 NI	$1,849
MultiSpin M700	17" diagonal CRT	.28mm	1280 x 1024 NI	$ 999

NEC SUPERSCRIPT COLOR 3000 AT A NEW LOW PRICE:
$399

NEC SUPERSCRIPT™: POWERFUL PRINTING POSSIBILITIES

Model	Resolution	PPM	Price
SuperScript C3000	300 dpi Wax Thermal Transfer; 300 dpi Variable Dot Thermal; 300 dpi Dye Sublimation	N/A	$399
SuperScript 660i	600 dpi	6ppm	$299
SuperScript 660	600 dpi	6ppm	$499
SuperScript 610 Plus	300 dpi	6ppm	$299

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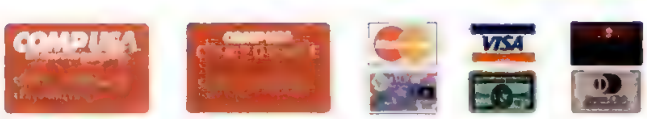

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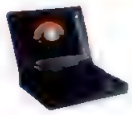

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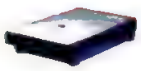

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Vista-S6E SOHO 300x600 dpi Color Flat	$564	$534
Vista-S8 PCLE2 400x800 dpi Color Flatbed	664	629
Vista-S12 PCLE2 600x1200 dpi Color Flat	875	830
PowerLook II PCPRO2 600x1200 dpi Color	1900	1800

MODEMS

US Robotics
Sportster 28.8
V.34 Data/Fax Ext.
$206 $196

	ELP	BCP
Sportster VI 28.8 V.34 Data/Fax Internal	$199	$189
Sportster 28.8/Fax PCMCIA	285	271
CARDINAL		
MVP 28.8I Int. Fax/Modem	$140	$133
MVP 28.8IV Int. Voice/Fax/Modem	167	158
MVP 28.8XV Ext. Voice/Fax/Modem	186	176
ZOOM		
PM144HC II 14.4/Fax	$69	$63
PM144MT II 14.4/Fax	84	75
PM288HC II V.34 28.8/Fax	155	147
PM288MT II V.34 28.8/Fax	173	164

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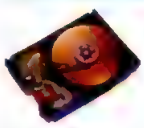

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Ditto Tape Drive 3200MB Internal	248	235
Ditto Tape Drive 3200MB External	305	289
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8000
$554 $524

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Multimedia Kit 7000	$354	$344
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Discovery CD 4X Internal	309	292
Blaster CD 4X IDE Internal	156	148

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Sony		
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Spressa 8cm Recordable, internal	005436	995

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Microtek		
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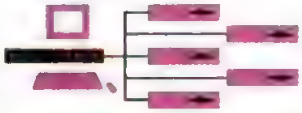

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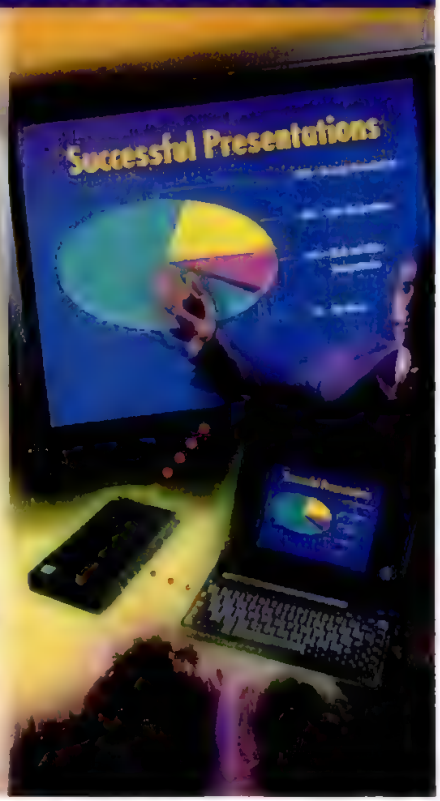

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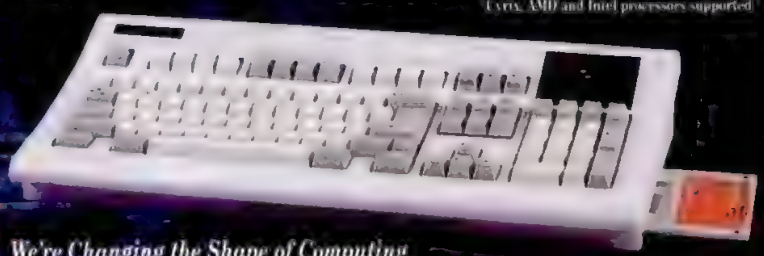

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2MB W-RAM PCI	$269	4MB W-RAM PCI	$495
4MB W-RAM PCI	$405		

MOTHERBOARD UPGRADES

CPU'S

All Memory and CPUs are tested previous to shipment to insure Quality

Model	Price	Voltage	Bus Speed	With Voltage Regulator
AMD 486 DX2 66	$ 38	5v	33MHz	$ 81-5v
DX4 80	45	3v	40MHz	99-5v
DX4 100	56	3v	33MHz	106-5v
DX4 120	76	3v	40MHz	129-5v
DX4 133	88	3v	33MHz	126-5v
Intel 486 DX4 66	69	5v	33MHz	N/A
DX4 100	100	3v	33MHz	131-5v
Pentium® 90Mhz	115			
100Mhz	205			
120Mhz	215			
133Mhz	275			
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Pentium Pro® 150Mhz	910			
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486

Model No	Price	Cache Size	Cache Type	VL-B Slots	PCI Slots	ISA Slots	30 Pin	72 Pin	Chipset	BIOS	Manufacturer
MB486VLPCI	$110	256K	write back	2	4	1		4	UMC	AMI	Serenity
MB486PCI	$105	256K	write back		3	4		4	Yes	AMI	Serenity

Pentium

All Pentium® 75MHz to 200MHz CPU's are 3 Volted, have 273 Pins, and can be used with these boards. When using Pipeline Burst or Synchronized Cache you can use EDO Memory

MBSerenity	$155	256K	Pipeline	3	4		4		Yes	Award	Serenity
MBTranquility	$199	256K	Pipeline	3	4		4		Yes	AMI	Serenity
MBP55CMS 256	$225	256K	Pipeline	3	4		4		Yes	AMI	Super Micro
MBP55CMS 512	$255	512K	Pipeline	3	4		4		Yes	AMI	Super Micro

Pentium Pro

These should only be used in a Network Environment

MBAurora	Call	256K	write back	2	4	1	4		Yes	AMI	Intel
MBP6DDF	$1600	512K	write back	2	4	1	4		Yes	AMI	Intel

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Capacity	Size	Intric	Access	Cache	RPM	Part No	Price
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*280MB	3.5"-1"	E-IDE	10ms	64KVRAM	4500	WDAC21200A	225
*620MB	3.5"-1"	E-IDE	9ms	64KVRAM	5200	WDAC31600A	289

Connor 3 yr warranty IDE

*275MB	3.5"-1"	E-IDE	12ms	64K	3600	CFS1275A	$220
*620MB	3.5"-1"	E-IDE	*4ms	64K	3600	CFS1621A	255

Maxtor 2 yr warranty IDE

*084MB	3.5"-1"	E-IDE	12ms	*28K	4480	MX71084AP	$205
*620MB	3.5"-1"	E-IDE	12ms	128K	4480	MX71626AP	249
2004MB	3.5"-1"	E-IDE	12ms	128K	4480	MX72004A	340

Seagate 5 yr warranty SCSI

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4290MB	3.5"-1"	SCSI	9ms	512K	5400	ST15230N	925
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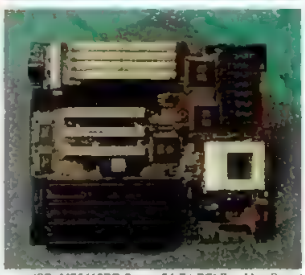

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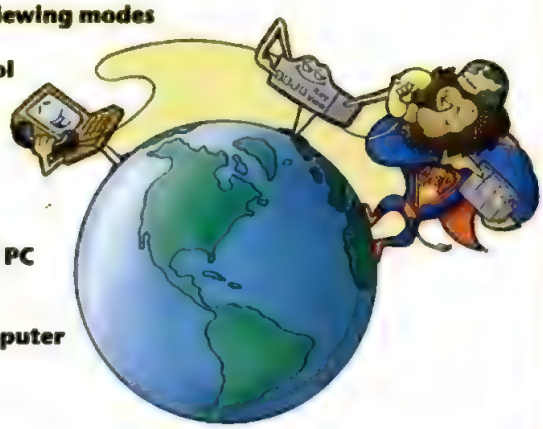

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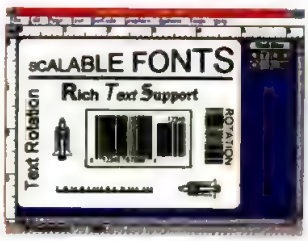

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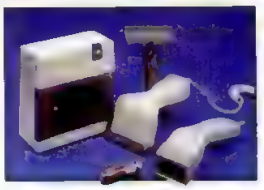

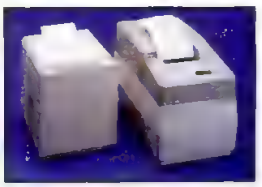

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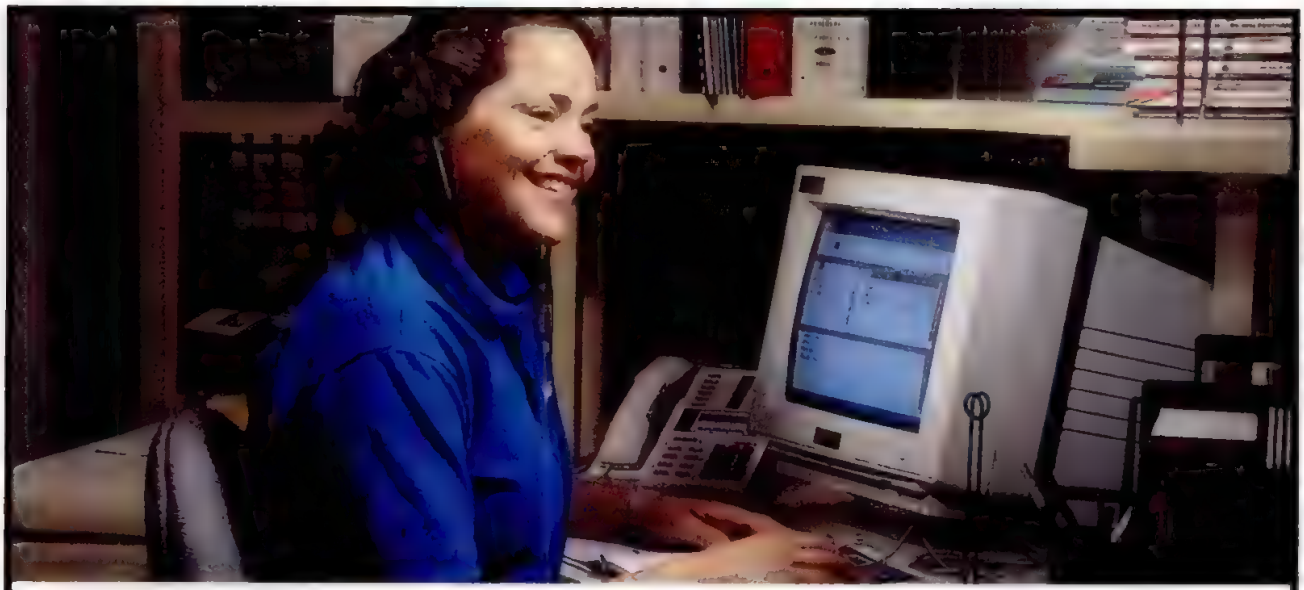

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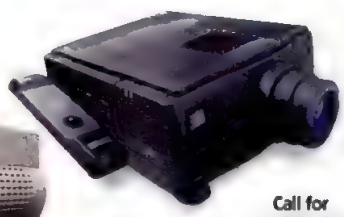

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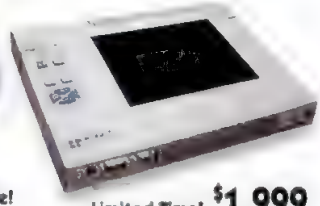

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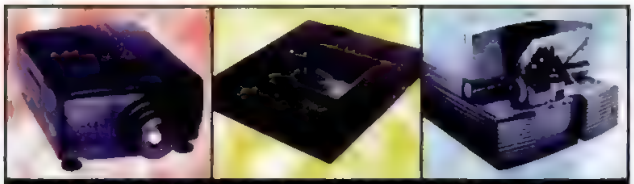

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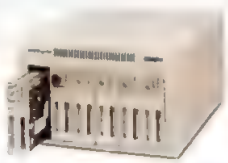

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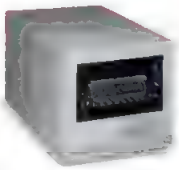

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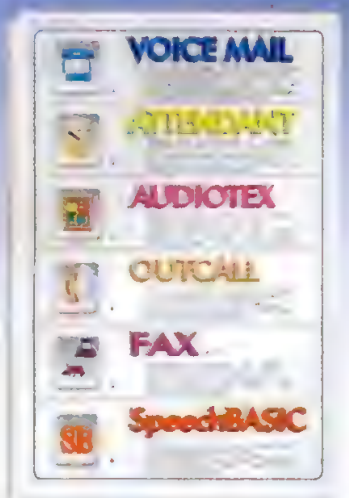

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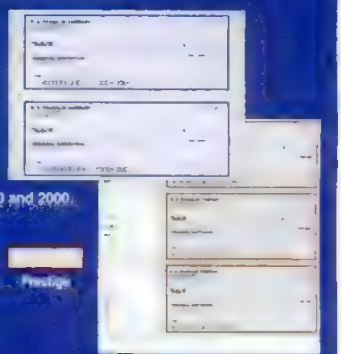

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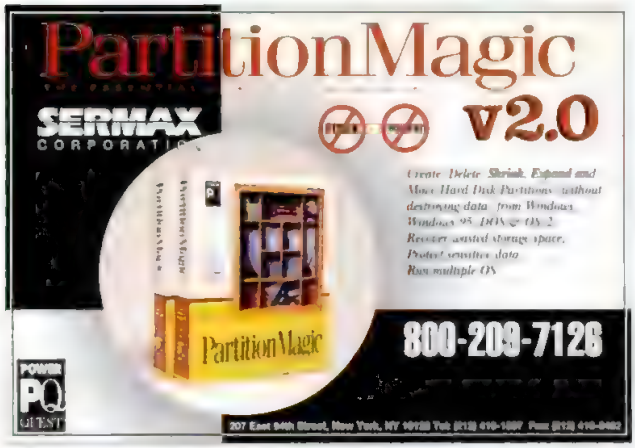

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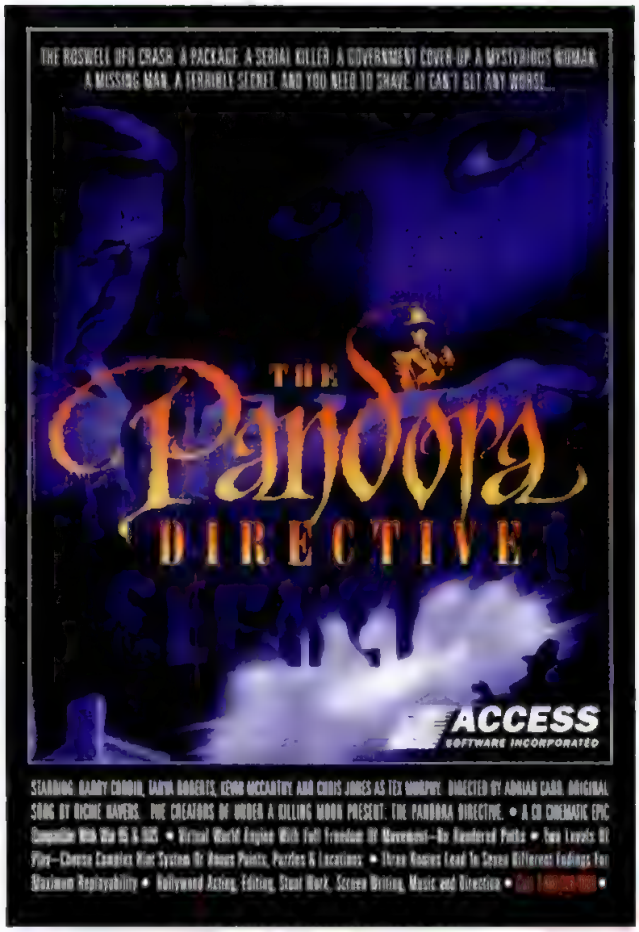

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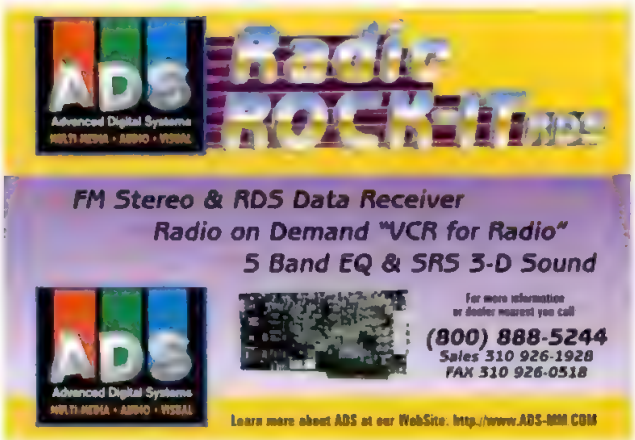

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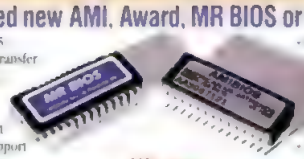

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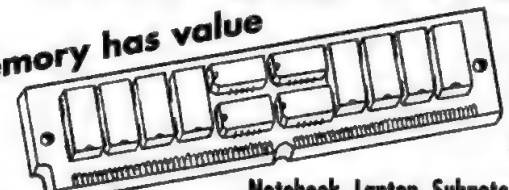

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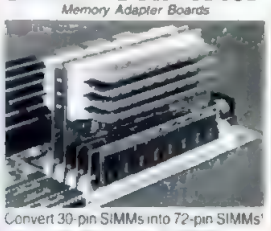

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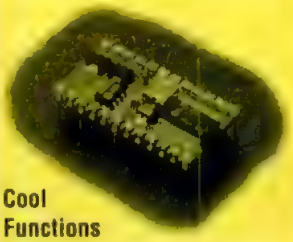

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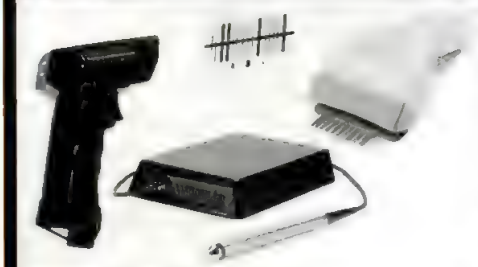

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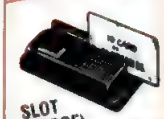

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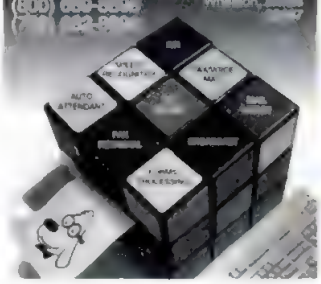

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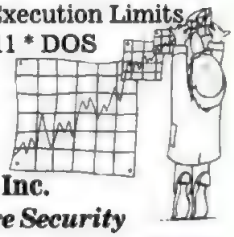

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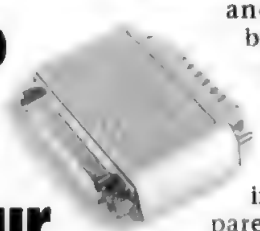

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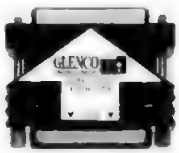

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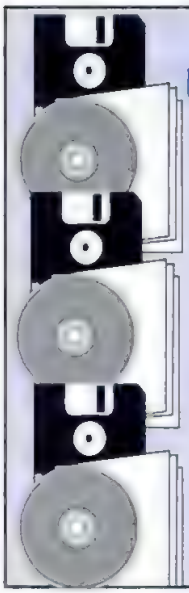

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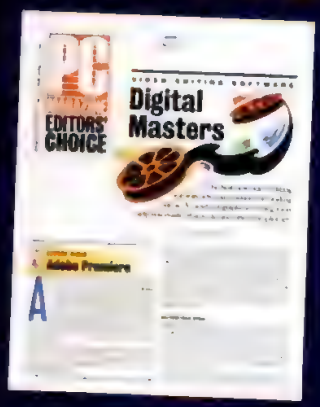

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After Hours

EDITOR'S RATINGS: ★ Poor ★★ Fair ★★★ Good ★★★★ Excellent

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Origin Raises the Stakes—Again

Wing Commander IV: The Price of Freedom

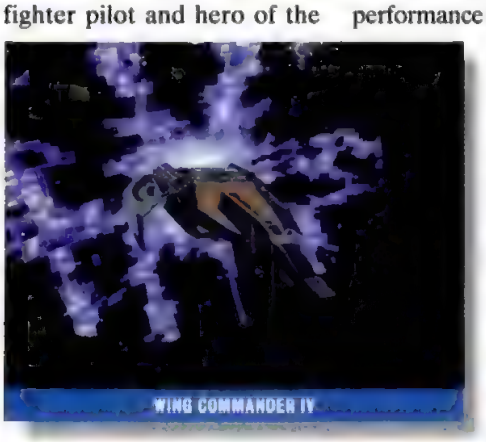
Origin Systems Inc.; 800-245-4525; http://www.ea.com/origin.html.

Circle 464 on reader service card.

★★★★

Once again, Origin Systems strives to take computer gamers to a new level. The company's latest effort, Wing Commander IV: The Price of Freedom, is a six–CD-ROM space epic that combines spectacular action with a movie-quality, interactive storyline to provide a memorable and thrilling gaming experience.

You play the role of Colonel Christopher Blair, fighter pilot and hero of the long, bitter war between the Terran Confederation and the Kilrathi (as chronicled in Wing Commander III: Heart of the Tiger). The war is now over and Blair (Mark Hamill) is retired, but because of terrorist activity in the volatile Border Worlds, Admiral Tolwyn (Malcolm McDowell) recalls you to active duty to investigate these events. What follows is a tale of adventure, intrigue, and betrayal that will test your loyalties as well as your flying skills.



The game is much more interactive than previous Wing Commander titles. During the first few minutes of the prologue, for example, you must react to several incidents and take part in a combat mission before continuing.

After that, you'll fly 25 or so more missions, with the exact number depending on your performance and your responses to various events throughout the game. Although the missions are intricate and less repetitive than those in previous Wing Commanders, we would have preferred to fly more of them (we completed 35 in Wing Commander III).

The space-combat engine is nearly identical to the one used in Wing Commander III, with several tweaks to make it faster and more challenging. Wing Commander III's biggest flaw—long mission-load times—is all but gone. Other improvements include much quicker transitions between the cockpit view and the occasional cinematic scenes that pop up during missions. Also, the game's artificial intelligence has been significantly enhanced, and new ships, such as the *Bearcat* and the *Dragon*, have been added.

On-board your carrier in between missions, you can interact with the crew in live-action scenes to learn more about the story while helping to shape it at the same time. Although they're not as engaging as the group from Wing Commander III, this crew has its share of characters, including Pliers the mechanic and your old pal Maniac (Tom Wilson).

Apart from the stunning quality of the live-action shots (filmed in 35 mm against real sets, not computer-animated backgrounds), the most notable improvement to the cinematic sequences is the conversation map. This map lets you move quickly to different areas on the carrier to take part in crucial conversations.

Like Wing Commander III before it, Wing Commander IV sets a new standard in gaming. Be advised, however, that the game runs best on a Pentium system with at least 8MB RAM, a quad-speed or faster CD-ROM drive, and a video card capable of displaying 16-bit color.—*Michael E. Ryan*

IN AFTER HOURS

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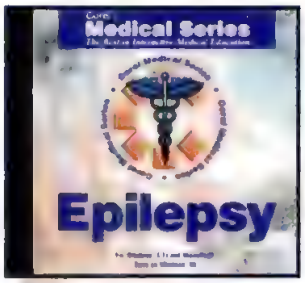

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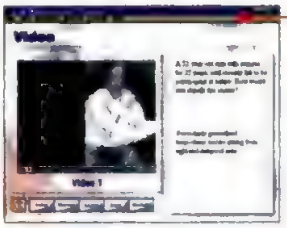

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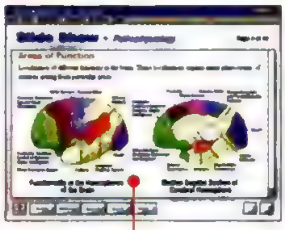

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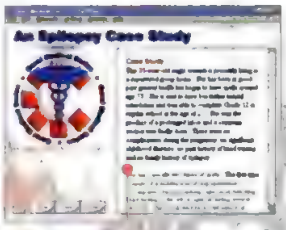

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CIRCLE 041 ON READER SERVICE CARD

Playtime and Storybook Learning

Since Wing Commander IV isn't exactly the type of game you might want your 6-year-old playing, we've taken a look at three titles that are perfect for 3- to 8-year-olds. The first is a computerized version of a classic toy, and the other two are animated storybooks.

Fisher-Price Great Adventures Castle

Davidson & Associates Inc.; 800-545-7677; http://www.davd.com.

Circle 465 on reader service card.

★★★ $30

The Fisher-Price Great Adventures Castle is a wonderful game that teaches decision-making, memory, and logical-thinking skills, as well as basic mouse skills. The game's colorful, active, and amusing cartoon world is loosely centered around one of Fisher-Price's most popular toys, the Castle Playset. (Davidson & Associates also makes five other CD-ROM games based on Fisher-Price toys.)

The game starts after the good King McBeard is captured by the evil King Smudge and his Naughty Knights. King McBeard's Good Knights have scattered into the village. It's your job to help McDuff find the hidden Good Knights, storm the castle, and rescue the king. This history and your charter are presented by Jester, who is also available throughout the game to provide clues.

The game offers two options for play: Find all six knights or just two of them. To find each knight, you must complete a series of tasks. For example, Sir Mount likes to hide out in McFadden's Hotel. To lure him out, you must first find the three missing stones that fit above the fireplace mantle. You do this by examining and clicking on the various objects in the hotel. The dialog and antics of this exercise are sure to induce giggling while teaching spatial relations.

When you and McDuff round up the proper number of knights, you run off to the castle. You click on each knight as his particular skill is needed in order to rout the Naughty Knights, unlock the dungeon door, and free King McBeard.

One technical note to keep in mind: Be sure to run this game at the recommended 256-color, Super VGA setting. Running at a higher color depth causes problems with several of the game's animations.—*Mary E. Behr*

Just Me and My Dad

GT Interactive Software Corp.; 800-610-4847; http://www.gtinteractive.com.

Circle 466 on reader service card.

★★★★ $39.95

Remember when a children's book was just a book? No longer. Kids today have access to a wide array of educational and entertaining CD-ROMs, such as this title based on Mercer Mayer's best-selling children's book *Just Me and My Dad.*

This interactive storybook allows kids to experience the story of Little Critter, who has come to the woods with his dad and his friends Spider and Grasshopper for a camping trip complete with fishing, ghost stories, and a night under the stars.

Just Me and My Dad lets you follow the story in a variety of ways. The easiest is simply to watch the story unfold like a movie as it plays right off the CD. You can also scroll through the easy-to-read story one colorful page at a time or have the story read aloud by Little Critter and his friends as you follow along on-screen. For more active kids, a play mode lets you click on the many hot spots that bring the story to life with sounds, musical numbers, and animations.

Just Me and My Dad is an impressive title that is just as cute and charming as the book that inspired it. In fact, the interactivity of play mode enhances the story with new characters, some of whom are completely outlandish, and all of whom are full of personality. These characters interject sayings, jokes, music, and poems that are as entertaining and unexpected for an adult as they are for a child.

Of course, what makes Little Critter great for children is that the story is consistently reinforced with practical lessons covering such topics as safety, forest-fire prevention, cleanliness, and respect for others.
—*Mary Paulson*

The Adventures of Peter Rabbit & Benjamin Bunny

Mindscape Inc.; 800-234-3088; http://www.mindscape.com.

Circle 467 on reader service card.

★★★ $35.00

Hippity-hopping through the woods, ravaging Mr. McGregor's garden, and drinking chamomile tea are all part of a day in the life of Peter Rabbit. And in Mindscape's The Adventures of Peter Rabbit & Benjamin Bunny, Beatrix Potter's mischievous bunny literally comes to life. If your child hasn't been exposed to the oh-so-English world of Potter and her critter creations, this package serves as a wonderful introduction.

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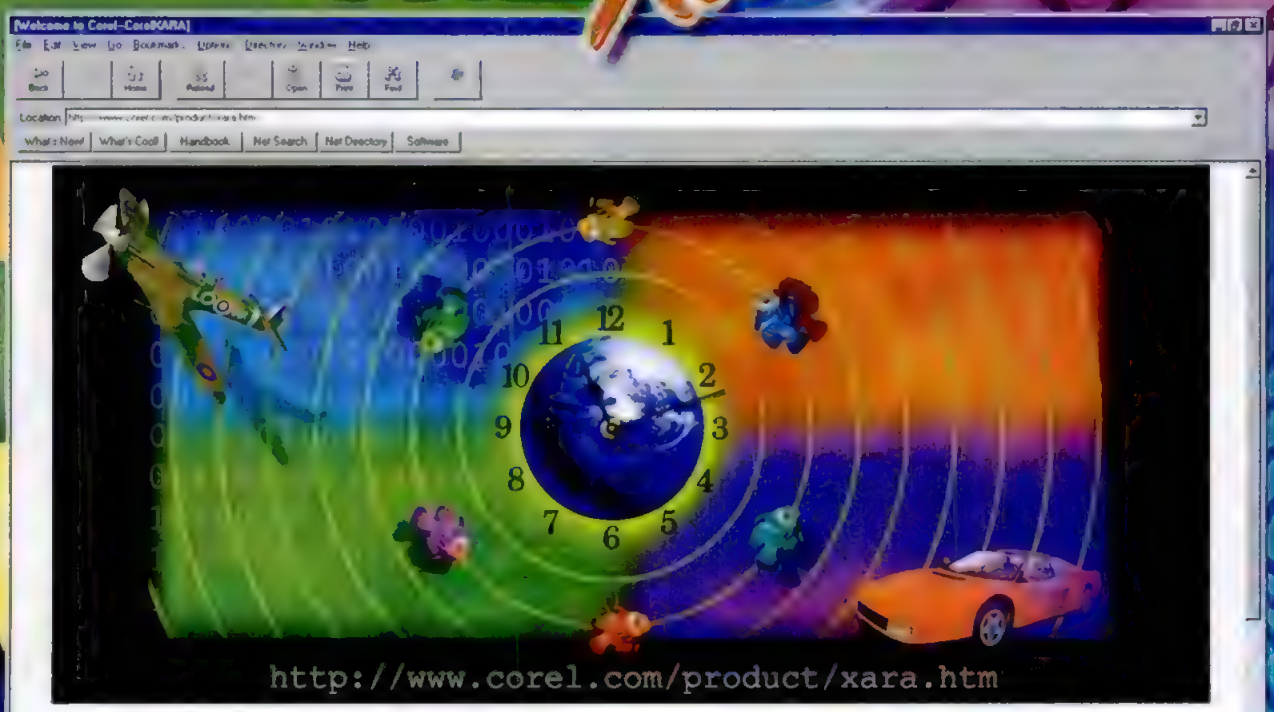

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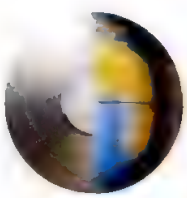

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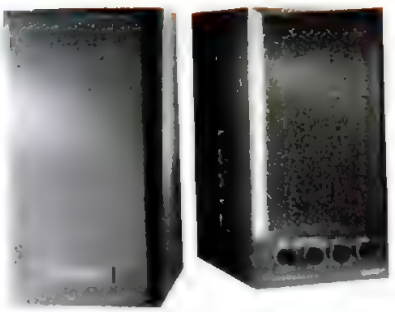

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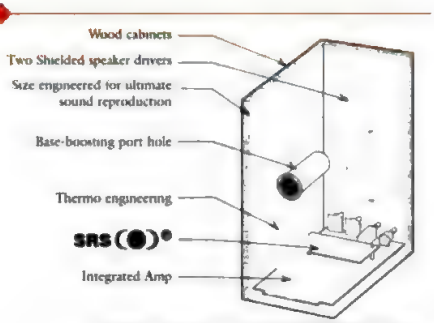

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Adventures of Peter Rabbit or *The Tale of Benjamin Bunny*.

The stories, each a charming combination of sound and animation, are presented perfectly for a child. The words are read slowly and highlighted as they are spoken—a useful feature for a child learning to read.

In addition to the stories, you can enter the world of the rabbit clan directly. By clicking on various points in the woods or on Mr. McGregor's garden, you can find an abundance of delightful animations.

Games are also scattered throughout the woods. For example, a butterfly puzzle awaits you beside the path, and for each correctly placed piece, you're congratulated with a "Perfect, I must say."

The woods and garden contain labels, which are read aloud when clicked on. And during your virtual stroll, you can click on woodpeckers, blooming flowers, baby birds, and squirrels, all of which respond with sound and animation. The music is the most delightful aspect of this title, capable of soothing even the most savage youngster.

We noted only two drawbacks. First, the title won't even install if you don't have a sound card. Second, this storybook is fairly resource-intensive and should be run on a Pentium system with at least 8MB RAM and a good video card.—*Sarah L. Roberts*

QUICK CLIPS

Recommended
It's Your Call
Not Recommended

The Logical Journey of the Zoombinis

The Bloats have forced the Zoombinis out of their homeland and you must help them find a new one. This delightful and entertaining title helps kids (age 8 to 12) develop math, logic, and puzzle-solving skills. $40; Broderbund Software Inc.; 800-521-6263.

The Beast Within: A Gabriel Knight Mystery

The sequel to 1994's Gabriel Knight: Sins of the Fathers, this excellent six-CD adventure game offers an intricate, branching plot, excellent production values, and many, many hours of game play. $64.95; Sierra On-Line Inc.; 800-757-7707.

Wide World of Animals

Using the same graphics engine and interface as 3D Atlas, this in-depth look at the animal kingdom is educational and lots of fun. Video clips, animations, and a trivia game help to captivate users of all ages. $49.95; Creative Wonders; 800-543-9778.

Top Gun: Fire at Will

This flight simulation—based on the movie *Top Gun*—features nice graphics and heavily customizable game play. Action outweighs realism here, but beginners may welcome that. $50.00; Spectrum Holobyte Inc.; 800-695-4263.

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Built for Speed

Falcon Northwest Mach V

Falcon Northwest Computer Systems; 800-258-6778; http://falcon-nw.com.

Circle 468 on reader service card.

★★★★ $4,582 (tested configuration)

Where some major PC vendors are just now targetting the gaming audience, a small vendor in Coos Bay, Oregon, has been entrenched in the market since 1992. Falcon Northwest Computer Systems has garnered quite a following among game enthusiasts, and we decided it was time to take out one of the systems for a spin.

FALCON NORTHWEST MACH V

The Falcon Northwest Mach V is a Pentium/166 system that comes loaded with high-end gaming components, including a CH Products speed-adjustable game card, a Sony SRS-D2KPC speaker system with subwoofer, a Sound Blaster 16 sound card with a Roland SCD-10 Sound Canvas wavetable daughterboard, and an STB PowerGraph 64 Video graphics adapter with 2MB of EDO DRAM. The system we tested also came with a CH FlightStick Pro joystick, a tried-and-true favorite among gamers. A 17-inch monitor and a Turtle Beach 8X CD-ROM drive rounded out the major features. Falcon custom-builds each of its PCs, so you can alter this configuration.

The Mach V does not come with any software bundles but ships with Microsoft Windows 95 and the DirectX library of drivers (which are used by most Windows 95–specific games) preinstalled.

The Mach V performed well on most of our benchmark tests. It even bested the Gateway P5-166, an Editors' Choice in our previous issue's home PC roundup (April 23, 1996), on both the Disk WinMark 96 and CPUmark$_{32}$ test suites. The Mach V did poorly only on the CD-ROM tests. Although the drive's throughput reached a dazzling 1,200 KBps, its access-time scores were worse than those of most 6X drives (263 ms at 66 percent CPU utilization). These scores are consistent with those of the Diamond Ultra Kit 8000, the only other 8X drive we've seen (January 23, 1996). Both drives are manufactured by Optics Storage.

The real test for this system is how well it runs games, so we threw at it every resource-intensive game we could find. We loaded several high-resolution games like Flight Unlimited, MechWarrior 2 (for DOS), and U.S. Navy Fighters, and were very impressed by the machine's ability to run each one at full resolution (1,024-by-768 in each case). We also ran Wing Commander III and IV, both of which screamed. Lower-resolution games like Dark Forces ran smoother yet.

The only game that gave us trouble was MechWarrior 2 for Windows 95, which locked up on every load. Although we could not pinpoint the exact problem, it seemed to result from a conflict between the game's installation of new DirectX drivers and the STB video drivers. We finally got the game to run, but we had to reinstall Windows 95 to do it.

Overall, we were impressed. The Mach V may cost a bit more than other systems, but hard-core gamers will find it worth the investment. *—Michael E. Ryan*

SUMMARY OF FEATURES

Home PCs

■ YES ■ NO Products listed in alphabetical order	Falcon Northwest Mach V	Gateway P5-166
Direct price (tested configuration)	$4,582	$3,837
Processor	Pentium/166	Pentium/166
Installed/maximum RAM	16MB EDO, 128MB	16MB EDO, 128MB
Hard disk capacity and interface	1.6GB EIDE	1.5GB EIDE
Graphics adapter (and memory)	STB Powergraph 64 Video (2MB EDO DRAM)	Matrox MGA Millennium (2MB WRAM)
Monitor (and screen diagonal claimed/measured)	Princeton Graphics Ultra 17 (17", 16")	Sony CPD-17F13 (17", 16")
CD-ROM drive (speed and interface)	Turtle Beach TBS-8010 (8X ATAPI)	Wearnes CDD-620 (6X ATAPI)
Sound adapter	Sound Blaster 16, Roland SCD-10 Sound Canvas	Ensoniq 9533
Installed external RAM cache and type	512K pipelined-burst	512K pipelined-burst
Motherboard manufacturer	Falcon	Intel
Chip set manufacturer and model	Intel Triton	Intel Triton
BIOS manufacturer and version	Award 4.50PG	AMI 1.00.01CN0T
Expansion-bus slots	4 ISA, 3 PCI	2 ISA, 3 PCI, 1 PCI/ISA
Accessible drive bays (5.25", 3.5")	2, 0	4, 1
Internal drive bays (5.25", 3.5")	2, 1	0, 7
Power-supply wattage	250W	145W
Parallel, serial, mouse ports	1, 2, 0	1, 2, 1
Speakers	Sony SRS-D2KPC	Altec Lansing ACS-400
Microphone/Headphones	■ ■	■ ■
Joystick included	CH FlightStick Pro	None
Speed-adjustable game card	■	■
Modem speed (data/fax)	33.6 Kbps/14.4 Kbps	28.8 Kbps/14.4 Kbps
Standard warranty on parts/labor	1 year/1 year	3 years/1 year
On-site service charge (first year)	Included	Included

BENCHMARK TESTS

Home PCs

The Mach V turned in respectable performance scores compared with those of the Gateway P5-166, an Editors' Choice winner in our most recent home PC roundup (April 23, 1996). While the P5-166 had the edge on our Winstone 96, Graphics WinMark 96, and CPUmark$_{16}$ tests, the Mach V came out on top on the Disk WinMark 96 and CPUmark$_{32}$ tests.

To test the performance of these systems, we used Winstone 96, Version 1.0, and WinBench, Version 1.0. The machines were equipped with 16MB of RAM and ran Windows 95.

Higher scores represent better performance. Red type denotes first place.	ZD Winstone 96	ZD Graphics WinMark 96 (Mpixels/sec)	ZD Disk WinMark 96	ZD CPUmark$_{16}$	ZD CPUmark$_{32}$
Falcon Northwest Mach V (Pentium/166)	72	28.4	1,070	323	333
Gateway P5-166 (Pentium/166)	77	30.3	1,030	326	326

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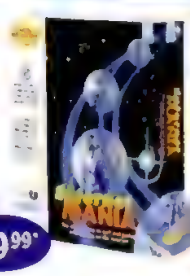

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Coming Up

The Future of the Web

Who will determine the shape and scope of the rapidly evolving World Wide Web? Microsoft and Netscape are lining up on opposite sides in the battle over the future of Internet interactivity. We take a look at Web server software, upcoming browser developments, and how it all fits together.

Beyond the Pentium

After standing alone at the top of the mainstream PC market for months, the Pentium processor is finally being challenged. While the 5_K86 from AMD should ship by early spring, the 6x86 P150+ and P166+ chips from both Cyrix and IBM Microelectronics are starting to appear on the market. We examine the current state of the microprocessor market and measure the performance of the first batch of P150+ and P166+ machines against the Pentium and the Pentium Pro.

Network Operating Environments

The network operating system (NOS)—once merely a way to let a small group of PC users share and print files—has come a long way: NOSs now include a slew of management and remote-access tools. Directory services, especially, are growing in popularity as a means to architect and manage a widespread network efficiently. And NOS vendors today are offering packages that add messaging, management, Internet connectivity, database and other applications to the NOS, creating an entire network environment. We test four major network operating systems and evaluate the full network operating environment offered by each vendor.

PC Magazine At Home: Printers

Home PC users voted with their dollars in 1995, making color ink jets by far the most popular printers for family use. The newest models cost less to buy and operate than last year's, print faster, and produce better output quality, even on plain paper. We look at ten of the most popular color ink jets for the home.

Databases

Do databases themselves dredge up feelings of dread for you? Well, fear no more: Many of today's databases cost less than $500 and don't require a lick of programming. In fact, developers have designed these databases with the end user in mind: Small workgroups can build applications, and corporations can efficiently run their entire businesses from them. We look at nine end-user databases and tell you how to make them work for you.

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Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

ARF on E-Mail? Well, Sort Of

Some ARF fans have asked whether they can send their submissions via e-mail. After all, don't we practice what we preach? Well, yes and no. If you have a joke, poem, or story that doesn't require any original source material to prove it's for real (you wouldn't try to fool us, would you?), feel free to send it to the e-mail address below. Otherwise, keep those cards and letters coming, literally.

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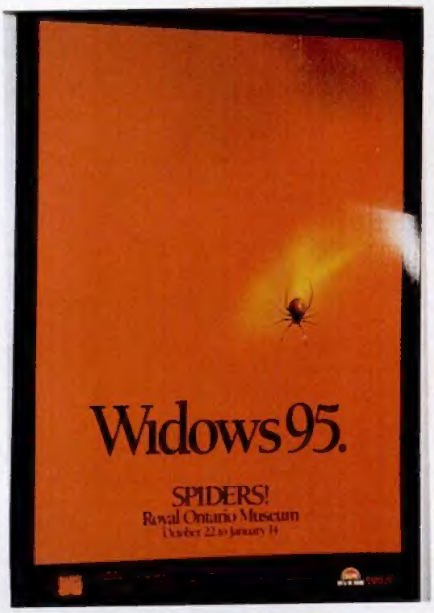

AFR on the Road: Toronto, Ontario. What else would the Royal Ontario Museum call its spider exhibition?

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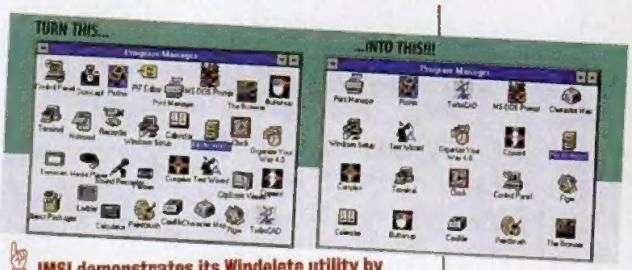

IMSI demonstrates its Windelete utility by erasing the Notepad, Calculator, Media Player, Clipbook Viewer, and PIF Editor, among other chunks of Windows.

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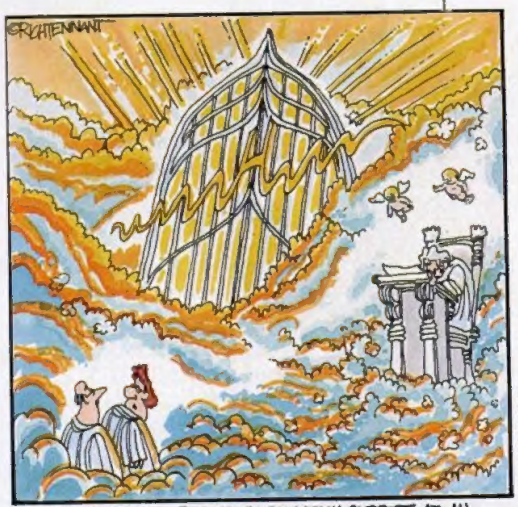
They've got trade shows for everything these days. Why not plan to attend the Year 2000 Conference and Exposition being held this year in New York, Chicago, and San Francisco? Seminars will address the issue of how to confront the estimated $600 billion cost of converting the world's software so it can handle dates after 1999. Maybe the attendees can also vote on whether to call the next decade the Aughts, the Naughts, or the Nothings.



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